



2001-2002 Mammalian Inventory Final Report for Selected Northern Colorado Plateau Network Parks:

Black Canyon of the Gunnison National Park

Capitol Reef National Park

Cedar Breaks National Monument

Curecanti National Recreation Area

Fossil Butte National Monument

Golden Spike National Historic Site

Hovenweep National Monument

Pipe Spring National Monument

Timpanogos Cave National Monument

15 February 2003

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Introduction

Historically, the Colorado Plateau has been the subject of many geological and biological explorations. J. W. Powell explored and mapped the canyon country of the Colorado River in 1869 (Powell [reprinted] 1961). C. H. Merriam, V. Bailey, M. Cary and other employees of the Bureau of Biological Survey conducted biological explorations of the area in the late 1800's. In recent times, researchers such as S. D. Durrant (1952), Durrant and Robinson (1962), D. M. Armstrong (1972), J. S. Findley et al. (1975), D. F. Hoffmeister (1986) and J. Fitzgerald et al. (1994) have made considerable contributions to our understanding of the fauna of the Colorado Plateau. Despite earlier efforts, biological details on many regions of the plateau have remained insufficiently explored.

In an effort to gather valuable biological information, the National Park Service (NPS) initiated a nationwide program to inventory vascular plants and vertebrates on NPS lands (NCPN Inventory Study Plan 2000). The U.S. Geological Survey, Fort Collins Science Center, Arid Lands Field Station became cooperators on this effort in 2001 when we began two-year mammalian inventories on nine parks within the NPS Northern Colorado Plateau Network: Black Canyon of the Gunnison National Park (BLCA), Capitol Reef National Park (CARE), Cedar Breaks National Monument (CEBR), Curecanti National Recreation Area (CURE), Fossil Butte National Monument (FOBU), Golden Spike National Historic Site (GOSP), Hovenweep National Monument (HOVE), Pipe Spring National Monument (PISP) and Timpanogos Cave National Monument (TICA). Existing baseline data on mammal occurrences in these parks varied from very little to nearly complete; in many cases information was insufficient to assess the status of species of local concern. Complete inventories were needed at GOSP, PISP and TICA.

Because of the region's widely varying topography, the southwest accommodates the highest native mammalian species richness in the country, with many species endemic to the area (Mac et al. 1998). With such a large number of species, it is only natural that this area be the focus of inventory efforts. Over the last decade less emphasis has been given to the status of large carnivores with small mammals earning more attention. The U.S. Fish and Wildlife Service's (1994) list of species of concern now emphasizes smaller species such as shrews, bats, rabbits, pocket gophers, tree squirrels, and a variety of mice and rats, mainly because of restricted ranges or lack of information. We know little of the status and trends of these species.

Objectives

The primary objective of these inventories was to attempt to document the occurrence of at least 90% of the mammals expected within each park by means of a two-year field effort and examination of existing pertinent records. Secondary objectives included: describing the distribution and abundance of species of special concern (e.g., Threatened and Endangered species, exotics, and other species of special management interest), providing baseline information necessary for the development of a monitoring strategy, and assisting in the development of a coordinated network data management effort resulting in biological resource information being accessible to resource managers, scientists, and the public. Data

from this project will directly contribute to the development of a long-term monitoring curriculum for each park.

Study Areas

The Colorado Plateau is a geologically and topographically distinct basin with numerous plateaus and surrounded by highlands. It is situated between the arid Great Basin to the west and the lush forests of the Rocky Mountains to the east, covering approximately 130,000 mi² from southeastern Utah and western Colorado, to northern Arizona and northwestern New Mexico (Wheeler 1990). Vegetation ranges from arid lowlands with cacti, saltbush and piñon-juniper woodlands; to open grasslands with scattered sagebrush and riparian woodlands; to high elevation coniferous forests, aspen and wet meadows. The NPS Northern Colorado Plateau Network includes parks in Utah, western Colorado, northern Arizona and southwestern Wyoming.

Black Canyon of the Gunnison National Park

Located approximately 400 km (250 mi) southwest of Denver in Montrose County, BLCA is a 12,660 ha (30,300 ac) preserve of scrub oak and piñon-juniper intermixed with patches of high desert sagebrush communities. The north-facing slopes of the canyon had Douglas fir and Colorado blue spruce. The river was lined with riparian vegetation, as well as scattered stands of ponderosa pine, Utah juniper and box elder. Elevations ranged from 1,645 to 2,675 m (5,400 to 8,775 ft).

Prior to these inventories, estimated completeness of biological inventories for mammals at BLCA was 65% and baseline inventories were recommended (NCPN Inventory Study Plan 2000).

Capitol Reef National Park

Capitol Reef National Park covers lands in Emery, Garfield, Sevier and Wayne counties, Utah. It included 97,896 ha (241,904 ac) of mostly piñon-juniper woodlands, grasslands, and upland shrub communities in elevations ranging from 1,183 to 2,731 m (3,880 to 8,960 ft). The lowest elevations also supported sparsely vegetated badlands. High elevations also supported aspen and coniferous woodlands. Riparian areas were be found at all elevations.

Prior to these inventories, estimated completeness of biological inventories for mammals at CARE was 65-70% and focused inventories were recommended (NCPN Inventory Study Plan 2000).

Cedar Breaks National Monument

Located 29 km (18 mi) east of Cedar City, in Iron County, Utah, CEBR was the park highest in elevation included in these inventories. Elevations ranged from 2,469 m (8,100 ft) on Ashdown Creek near the western boundary to 3,250 m (10,662 ft) in the northeast section of the park above the amphitheater rim. Ponderosa pine, blue spruce, and Douglas fir with an understory of Rocky Mountain maple, greenleaf manzanita and Oregon grape dominated the lowlands. The highlands consisted of Englemann spruce and subalpine fir with an understory of monkshood, Oregon grape and gooseberry, and subalpine meadows of grasses, sedges and

a variety of forbs. Cedar Breaks National Monument encompassed 2,490 ha (6,154 ac) of land.

Prior to these inventories, estimated completeness of biological inventories for mammals at CEBR was 50% and baseline inventories were recommended (NCPN Inventory Study Plan 2000).

Curecanti National Recreation Area

Curecanti National Recreation Area is located 315 km (196 mi) southwest of Denver, Colorado, in Gunnison and Montrose counties. It encompassed 16,390 ha (40,500 ac) of shoreline and mesas surrounding Blue Mesa Reservoir. The mesa tops were covered with high desert vegetation with intermittent pockets of Douglas fir, aspen and spruce. Between the mesa tops were north-south running canyons housing lush riparian communities. Shrubs and conifers were found on the north-facing slopes and canyon rims. The shoreline consisted of grasses, big sagebrush, rabbitbrush and Gambel oak communities. The Gunnison River and tributary streams were located within the park. Elevations range from 1,981 to 2,896 m (6,500 to 9,500 ft).

Prior to these inventories, estimated completeness of biological inventories for mammals at CURE was 75% and baseline inventories were recommended (NCPN Inventory Study Plan 2000).

Fossil Butte National Monument

Found in Lincoln County, Wyoming, 160 km (100 mi) south of Jackson, FOBU was the northernmost park of this effort. The flora of FOBU included sagebrush, aspen, mixed timber, grasses, forbs, and wet meadows. Elevations ranged from 2,018 m (6,620 ft) where Chicken Creek crossed the boundary near the main entrance to 2,464 m (8,084 ft) on Bull Pen summit. Fossil Butte National Monument encompassed 3,318 ha (8,198 ac) of land.

Prior to these inventories, estimated completeness of biological inventories for mammals at FOBU was 80% and baseline inventories were recommended (NCPN Inventory Study Plan 2000).

Golden Spike National Historic Site

Eighty-eight kilometers (55 mi) north of Ogden, Utah, in Box Elder County, sits GOSP, the site of the historic transcontinental meeting of the Union Pacific and Central Pacific Railroads. This park covered 1,107 ha (2,735 ac) of big sagebrush, rabbitbrush, broom snakeweed, Indian ricegrass and a variety of non-native grasses. A few Utah junipers, one historic box elder tree, a small canyon with ephemeral pools of water and a small stream (Blue Creek) were also found on the park.

Prior to these inventories, estimated completeness of biological inventories for mammals at GOSP was 50% and baseline inventories were recommended (NCPN Inventory Study Plan 2000).

Hovenweep National Monument

Hovenweep National Monument was comprised of seven units in San Juan County, Utah, and Montezuma County, Colorado. Combined, the units encompassed 318 ha (785 ac). Elevations range from 1,585 m (5,200 ft) at the Cajon unit to 2,060 m (6,760 ft) at the Goodman Point unit. Most of the units were in juniper-sage and sage areas, but rabbitbrush, cliffrose, Mormon tea, yucca and serviceberry were also commonly found.

Prior to these inventories, estimated completeness of biological inventories for mammals at HOVE was 75% and baseline inventories were recommended (NCPN Inventory Study Plan 2000).

Pipe Spring National Monument

Pipe Spring National Monument, Mohave County, Arizona, is situated 16 km (10 mi) south of the Arizona-Utah border. This 16 ha (40 ac) park is the site of a historic ranch. The majority of the vegetation on the park was semi-desert sagebrush and grassland with piñon-juniper occurring on the higher elevations. Other flora included rabbitbrush and prickly pear cactus. Mixed forbs and sedges surrounded a small spring. The park also included corrals, outbuildings, orchards and a vegetable garden. Elevations ranged from 1,500 to 1,555 m (4,923 to 5,100 ft).

Prior to these inventories, estimated completeness of biological inventories for mammals at PISP was 20% and baseline inventories were recommended (NCPN Inventory Study Plan 2000).

Timpanogos Cave National Monument

Timpanogos Cave National Monument is located 19 km (12 mi) east of Lehi, Utah, in American Fork Canyon and encompassed 101 ha (250 ac) in the Wasatch Mountains. With elevations ranging from 1,670 to 2,454 m (5,480 to 8,050 ft), it accommodated a variety of habitats including piñon-juniper, mountain brush, mixed fir and riparian.

Prior to these inventories, estimated completeness of biological inventories for mammals at TICA was 50-60% and baseline inventories were recommended (NCPN Inventory Study Plan 2000).

Methods

Initially, we prepared a list of mammals (“master list”) for each park that included all species that might occur in or near each park. Primary references for this list were Armstrong (1972), Clark (1977), Clark and Stromberg (1987), Durrant (1952), Durrant and Robinson (1962), Findley et al. (1975), Fitzgerald et al. (1994), Hall (1981) and Hoffmeister (1986). Species on each list were designated as unconfirmed (i.e., unlikely to occur), possibly present (i.e., species likely to occur; range includes or is near the park), or present (i.e., documented in some fashion) for that park. Our lists indicate cases in which documentation relies on specimens listed as examined in these references. These lists were updated based on data collected in 2001 and subsequently updated again following the 2002 field season. At that time (2002) we also made a more critical assessment of the likelihood that some

undocumented species (“Probably Present”) do not occur (“Unconfirmed”). Using the updated lists, we assessed our progress toward documenting 90% of likely species occurring on a given park.

Field efforts in 2001 used random as well as targeted searches and trapping. Field efforts in 2002 focused on the most speciose groups with the greatest promise of increasing the level of documentation, especially carnivores, bats, and rodents. We specifically inventoried for small terrestrial mammals, bats and carnivores. Inventory methods included traplines, mistnetting, acoustic surveys, and track and scat surveys. Other mammal groups (e.g., ungulates) were documented opportunistically. In general, photographs were taken of most, but not all, study locations. Reference maps with study site designations keyed to tables and databases are provided in Appendix E.

In most instances, animals were captured alive, identified to species, assessed for age, sex, and reproductive condition, and released unharmed. Animals that were previously undocumented in a park were kept as vouchers. Vouchers of selected individuals were also retained for identification verification (Appendix D). All trapping and observation locations were recorded using Global Positioning System (GPS; Garmin 12) units set to UTM, NAD27, in accordance with NCPN protocol. Data was recorded onto datasheets and then entered into an electronic spreadsheet provided by NCPN. In general, we did not use photographs as vouchers. A key to abbreviations used on field datasheets and in the electronic dataset is given in Appendix B.

Capture and handling of animals was performed in accordance with written protocol approved by the USGS Fort Collins Science Center, Animal Care and Use Committee. Voucher specimens (skins and skeletal material) are housed in the USGS Biological Survey collection at the Museum of Southwestern Biology, University of New Mexico (UNM). Samples of heart, kidneys and liver were preserved in liquid nitrogen and deposited in the Division of Genomic Resources at UNM. A list of field technicians is given in Appendix C.

Small terrestrial mammal inventories

We inventoried for rodents and other small terrestrial mammals using Sherman live traps, Havahart live traps, pitfall arrays or snap traps arranged in traplines (Wilson et al. 1996). Traplines typically consisted of 40-80 traps placed at 10-15 m intervals. Paired transect lines (Calhoun) were also used. Traps were baited with dry oatmeal and left open overnight and often during diurnal hours. Un-baited pitfall traps, consisting of 1-gallon plastic buckets, were buried at ground level in attempts to capture insectivores and other small mammals. Traps were set in both targeted and randomly chosen areas during 2001 field efforts. Study sites were selected so that each major type of habitat within a given park was sampled. During 2002, most traplines were set in areas likely to have a successful yield for targeted species. Effort was reported as number of trap-nights (total number of traps multiplied by number of days).

Bat inventories

Bats were inventoried using mist nets and acoustic surveys. Mist nets were deployed across and around bodies of water in order to capture bats coming in to drink or feed on insects

flying over the water (Kunz and Kurta 1988). Size of nets ranged from 6-20 m (18-60 ft) and number of nets varied depending on the area of the body of water. Mist nets were set up shortly before sunset and tended for several hours until activity declined. Number of nets used varied, depending on the size and shape of the body of water. This method is especially effective when sources of water in the landscape are limited, as this causes bats to be concentrated in a relatively small area where they are more susceptible to capture.

Acoustic surveys entailed using a bat detector and zero-crossing analysis interface module (ZCAIM; Anabat II hardware, Anabat software version 6.3f; Titley Electronics, Ballina, New South Wales, Australia) with a laptop computer to record echolocation calls. A bat detector produces audible output from the ultrasonic calls emitted by echolocating bats. The ZCAIM interfaces the audio-frequency signal from the detector to a computer. Analyses were performed using Analook software (version 4.8n, Titley Electronics, Ballina, New South Wales, Australia). The frequency-time display generated by the software from detected echolocation call sequences were then used to identify species based on qualitative analysis of call parameters compared to reference calls from known individuals (Fenton and Bell 1981; O'Farrell et al. 1999). This method is useful when no water is available over which to net or when water is too ample to effectively concentrate bats over a small enough area for capture. Acoustic surveys are also useful for detecting species that are not easily captured in mist nets.

Effort was recorded as net-nights (number of mist nets multiplied by number of nights) and acoustic hours (total number of hours spent recording echolocation calls).

Carnivore inventories

In order to document carnivores, we conducted track-scat surveys, live-trapping, and spotlighting. Track-scat surveys entailed searching the parks on foot in areas likely to attract animals and show evidence of animals, such as around water sources, in canyon bottoms, in sandy soils, and around areas where humans leave refuse (e.g. campgrounds and housing areas). Tracks, scat, carcasses, and animals were documented with photographs, when possible, and location coordinates. We also attempted to capture small carnivores using Havahart live-traps baited with a variety of malodorous items. We used a handheld spotlight from a vehicle to view animals at night. Effort for carnivore inventories was quantified as survey distance (km) or number of trap-nights. Carnivore inventories were conducted only in 2002.

Opportunistic observations

Any time a species or sign of a species (e.g. tracks, scat, middens) was observed that had not been documented by trapping or other means, it was noted. Location was recorded for all opportunistic observations, and when possible a voucher photograph was obtained. Opportunistic observations were the predominant means of documenting ungulates, but many other species were also documented in this manner. In addition and where possible, we perused park observation files for records of mammals. In cases where the species is distinct and unlikely to be confused with another, we generally accepted the observation, especially if there were multiple occurrences. In other cases where the species might likely be confused with another, or where there was only a single observation, we usually discounted it.

Data analyses

Species richness (number of species documented) and relative abundance of species (percent of all individuals detected) were calculated for each park. We also provided a summary of effort for each park including person-days, trap-nights, mist net-nights, acoustic hours and survey distance, as appropriate. In order to evaluate the effort expended related to completion of inventories, we generated species accumulation curves. We also performed regression analyses to compare park size with number of species likely to occur, number of species documented, and percent of likely species documented for each park.

Results

On NCPN parks during 2001, we amassed a total of 11,773 trap-nights and 108 mist net-nights from which we obtained data on 2,225 captures, observations and reports of 79 species of mammals on parklands (Tables 1-9). A field schedule for this effort is attached (Table 10). We captured approximately 2,008 mammals of 52 species (3 insectivores, 17 bats, 1 lagomorph, 30 rodents, and 1 carnivore; Table 11). The most abundant species was the deer mouse (*Peromyscus maniculatus*), comprising 34% of captures. We also documented 27 additional species by observation, photograph, scat, tracks or interviews with park staff. Additional species were documented by data mining efforts using published literature and museum records. By park, the 2001 level of documentation (documented species/likely species using final master list) was: BLCA, 63%; CARE, 89%; CEBR, 47%; CURE, 61%; FOBU, 69%; GOSP, 42%; HOVE, 45%; PISP, 53%; and TICA, 29% (Table 12). A list of species common names and Latin names is provided in Appendix A.

During 2002, we amassed a total of 2,576 trap-nights, 65 mist net-nights, 86.3 acoustic survey hours, and 450.9 km of track-scat survey distance (Tables 13-21). A field schedule for this effort is attached (Table 22). We captured or observed signs of 1,077 mammals of 67 species (1 species of insectivore, 17 bats, 3 lagomorphs, 31 rodents, 11 carnivores, and 4 artiodactyls; Table 23). Fifty-one occurrences were new to the 2002 inventories. Twenty-eight additional occurrences from NPS observations files were determined to be reliable. Following the 2002 inventories, level of documentation for parks was: BLCA, 83%; CARE, 89%; CEBR, 62%; CURE, 80%; FOBU, 84%; GOSP, 67%; HOVE, 71%; PISP, 68%; and TICA, 74% (Table 12).

Our total effort on this project has been significant. During two years of field studies we amassed a total of 14,349 trap-nights, 173 mist net-nights, 3,302 actual capture events (during which species were (mostly) identified and released unharmed) that resulted in recording of 119 individual species occurrences (52 species in 2001, 67 species in 2002). Total numbers of person-days in the field were 562, the equivalent of 1.54yrs. In addition, we have spent over one year's worth of person-days in compiling data and writing reports.

To date, "data mining" in the form of examination of specimen holdings from selected museums has not yielded documentation beyond that indicated in Tables 26-34. Such "data mining" should be viewed with caution as no museum will guarantee that animals deposited in that museum are correctly identified. The only sure method is to visit each museum and

personally examine the specimen(s). In addition to separate electronic databases provided with this report, a summary of mammals captured and observed (Table 24) and a tabulation of percent relative abundance for all mammals captured or observed during both years (Table 25) are attached. Not all figures in Table 25 are necessarily directly comparable as different methodologies were used in sampling the various groups. Nonetheless, the abundance figures are interesting, if only to show how relatively uncommon some species are on national parks. Conversely, some species are almost overwhelmingly abundant (e.g., deer mice: 28.9% of all animals across all parks). Our summary comments for each park (below) provide some information on specific steps that can be taken to enhance levels of documentation at each park.

Black Canyon of the Gunnison National Park

2001. At BLCA our efforts consisted of 12 mist net-nights and 1,240 trap-nights, during which we documented 13 species of bats by capture, audible call or recorded echolocation call sequences; and 12 species of small terrestrial mammals by live-trapping or observation. Although we did not capture the big free-tailed bat (*Nyctinomops macrotis*) or spotted bat, (*Euderma maculatum*), we were able to document these two species by their unique audible calls. We also documented California myotis (*Myotis californicus*), little brown bat (*M. lucifugus*) and Brazilian free-tailed bat (*Tadarida brasiliensis*) during acoustic surveys. Of note was our capture of Yuma myotis (*M. yumanensis*), the first known occurrence of this species for Montrose County. The most abundant bat species documented were long-legged myotis (*M. volans*), which accounted for 30% (14 individuals) of bat captures, and long-eared myotis (*M. evotis*), which accounted for 22% (10 individuals).

The deer mouse, a widespread and common species across North America (Hall 1981), was the most frequently captured species (179 individuals), followed by the brush mouse (*P. boylii*, 34 individuals captured), least chipmunk (*Eutamias minimus*, 24) and bushy-tailed woodrat (*Neotoma cinerea*, 19). We believe that our capture of the Hopi chipmunk (*E. rufus*) was the first for BLCA. We also observed or documented by sign Nuttall's cottontail (*Sylvilagus nuttalli*), rock squirrel (*Spermophilus variegatus*), porcupine (*Erethizon dorsatum*), coyote (*Canis latrans*), black bear (*Ursus americanus*), mountain lion (*Puma concolor*), bobcat (*Lynx rufus*), elk (*Cervus elaphus*) and mule deer (*Odocoileus hemionus*).

Species richness for locations sampled for bats was highest at the pond in the drainage by Dead Horse Trail, 1.4 mi SW of Poison Spring Hill (waypoint BL01A), where 8 species were documented. Species richness for locations sampled for terrestrial mammals was highest at the turn-around loop SE of Kneeling Camel view area (RBL23A, B), where 7 species were documented.

Our work in 2001 and that of other earlier workers (e.g., Armstrong 1972, Long and Hoffmann 1992) resulted in good documentation of some groups, such as bats (88% of likely species), rodents (72%) and artiodactyls (67%) but other groups needed additional work. In particular, more effort was needed to document the occurrences of species of carnivores (36%).

2002. Efforts during the 2002 field season focused on track-scat surveys, searching onsite NPS observation files, and interviews with park staff, primarily to document species of carnivores. We spent 10 person-days and a track-scat survey distance of 56.7 km and documented 8 species, 3 of which were not observed in 2001: ringtail (*Bassariscus astutus*), raccoon (*Procyon lotor*) and gray fox (*Urocyon cinereoargenteus*). The most common species was coyote, which comprised nearly 24% of all observations. Other common species included bobcat (19%), raccoon (14%), and black bear (14%). Species richness was greatest at Warner Point trail (waypoint BL07B) where 2 species were documented during track-scat surveys. After assessing reliability of selected park observation files or annual reports, we added 8 additional species of rodents and carnivores (Table 26).

Summary. Overall level of documentation at BLCA is 83% and earlier work conducted on the park contributes to this figure significantly. Only two groups fall markedly below a 90% level of documentation, shrews (40%) and lagomorphs (33%). Pitfall traps in appropriate habitats likely would yield at least one or two more species of shrews, whereas additional field time, especially collection of specimens, would verify the presence of one or two species of hares. In addition, on the basis of fragmentary echolocation recordings, we expect that there are at least two more species of bats that occur here, California myotis and Brazilian free-tailed bat. Nonetheless, adding these final few species to the list of those documented may require considerable time.

Capitol Reef National Park

2001. In 2001, we accumulated a total of 58 mist net-nights and 2,297 trap-nights. We netted or recorded echolocation calls of 218 bats of 16 species and captured or observed 166 terrestrial mammals of 24 species. Our captures of the long-eared myotis (*M. evotis*) and the big free-tailed bat represent new species records for CARE.

Although deer mice are generally the most common species of rodent on the Colorado Plateau, at CARE the number of captures for this species was surpassed by those of the piñon mouse (*P. truei*, 59) and Great Basin pocket mouse (*Perognathus parvus*, 37), numbers that reflected the habitats trapped in 2001. Sixteen additional species documentations came from reliable NPS staff reports and museum records.

Species richness for locations sampled for bats was highest at the Fremont River just off the main park road (waypoint CR006A) and 0.5 mi S of Cedar Mesa Campground (CR007A), where 9 species were documented at each location. Species richness for locations sampled for terrestrial mammals was highest at Jones Bench (RCR08) and Halls Creek N of the narrows (RCR11), where 5 species were documented at each location.

Capitol Reef is the one park in the NCPN that appears to have approached the criterion for documentation of 90% of species likely to occur at the park. For insectivores, bats, and artiodactyls, 100% of species were documented; and for rodents 95% of species were documented during 2001, respectively. Only lagomorphs (50%) and carnivores (73%) remained underrepresented.

2002. During three visits to CARE in 2002, we expended 15 person-days, 8 mist net-nights, 8 acoustic survey-hours, and traversed 455.8 km in track-scat survey distance. We captured or observed 138 mammals of 22 species. Five species known or suspected from the park but that were not found during the first year of inventory were documented in 2002: white-tailed antelope squirrel (*Ammospermophilus leucurus*), American beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), badger (*Taxidea taxus*), and gray fox (*Urocyon cinereoargenteus*; Table 27). Little brown bat call sequences may have been recorded during acoustic surveys, but the presence of this species needs to be verified with a voucher specimen.

Species richness for locations sampled for bats was highest at the Fremont River near the Hickman Bridge trailhead (waypoint CR003A), where 12 species were documented. The most common species was western pipistrelle (*Pipistrellus hesperus*), which accounted for nearly 35% of observations. Pallid bat was also common, comprising 16% of observations.

Summary. Documentation exists for 89% of the mammal species at CARE. Again, this park has been the beneficiary of recent surveys (1988-93) and other work (e.g., Hoddenbach 1978) that provided extensive baseline data on mammals for the park. It seems likely that one or two additional lagomorph species occur on the park, both relatively high-elevation species (white-tailed jackrabbit and Nuttall's cottontail) and there is the possibility that flying squirrels or red squirrels also occur at upper elevations in the park. Lagomorphs should preferably be collected to help verify identifications. The squirrels could be identified through observation of animals or, in the case of red squirrels, middens of cones. We think there are probably still four or so species of carnivores that need documenting from the park, although all of these have been noted as being observed (park files).

Cedar Break National Monument

2001. Our efforts at CEBR included 7 mist net-nights and 1,885 trap-nights. These efforts resulted in 262 observations including captures or echolocation recordings of 7 species of bats, and captured or observed 19 species of terrestrial mammals.

At CEBR we collected 3 montane shrews (*Sorex monticolus*), some of the few shrew captures obtained during 2001. We also netted 2 individuals of little brown bat, a relatively uncommon species in this part of Utah (Oliver 2000). Additionally, three species of bats were recorded during acoustic surveys, which need to be verified with voucher specimens: hoary bat, California myotis, and Brazilian free-tailed bat.

Common rodents at CEBR included Uinta (*E. umbrinus*, 62) and least (18) chipmunks, canyon mice (*P. crinitus*, 16), deer mice (113), montane voles (*Microtus montanus*, 13), and long-tailed voles (*M. longicaudus*, 10). We captured several northern pocket gophers (*Thomomys talpoides*). We also captured an ermine (*Mustela erminea*) in one of our Sherman live-traps. We also observed but did not capture a golden-mantled ground squirrel (*Spermophilus lateralis*), located near the visitor center. Rodents (63% of likely species documented) and artiodactyls (67%) are relatively well known at CEBR, but other groups, especially insectivores (25%), bats (55%), and carnivores (31%), were underrepresented in 2001.

Species richness for locations sampled for bats was highest at the pond near the junction of highways 143 and 148 (waypoint CE001A), where 5 species were captured in mist nets or recorded during acoustic surveys. Species richness for locations sampled for terrestrial mammals was highest along the rim of the breaks, 1 km N of the campground (RCE45), where 6 species were captured.

2002. Efforts at CEBR during 2002 resulted in the capture or observation of 99 animals of 19 species, including 5 bats, 9 rodents, 4 carnivores, and one ungulate, 6 of which were not documented during the first year of the inventory: coyote, spotted bat, striped skunk, piñon mouse, red fox, and western jumping mouse. The record for the jumping mouse is slightly outside the known distribution. Bat species for which we recorded echolocation call sequences were California myotis, hoary bat, and Brazilian free-tailed bat. These occurrences need to be verified with specimen vouchers. We also added one species from observation files to the species list—long-tailed weasel (*M. frenata*; Table 28). Overall, during 2002, we accumulated 28 person-days, 458 trap-nights, 9 mist net-nights, 13 acoustic survey-hours, and a track-scat survey distance of 100.5 km during 3 visits.

The locations with the highest species richness were the pond near the junction of highways 143 and 148 (waypoint CE001A) and Alpine Pond (CE002A), where 7 species were documented by mistnetting, acoustic surveys, and opportunistic observations. Pika has been reported from the rockslide area of the Alpine Pond Trail but we were unable to substantiate this.

Deer mice were the most frequently encountered species at CEBR, and comprised 39% of all captures or observations. The next most common species were Uinta chipmunk and long-legged myotis (*M. volans*), each comprising about 10% of individuals encountered.

Summary. Although we were able to increase levels of documentation almost 20% during our second year at CEBR, from 47% to 62%, this park is a good example of the difficulties in attempting to document 90% of species in a two-year time period. We do not think our “predicted” list is unrealistic and expect that at least 3 species of bats, 3 species of lagomorphs, four species of rodents, and 4 carnivores remain undocumented for the park; all are expected based on the size and available habitats at the park. Documenting additional species of bats will require additional time either mistnetting or recording echolocation calls, whereas the missing rodents will require a combination of observation time and trapping. Two of the rodents (cliff chipmunk and rock squirrel) are probably most common at lower elevations (e.g., Ashdown Creek) although we have not seen these species. Additional observation time or camera units will be required to document the remaining carnivores.

Curecanti National Recreation Area

2001. At CURE, we compiled a total of 19 mist net-nights and 1,338 trap-nights and captured or observed a total of 393 mammals. Three hundred fifty-eight of these observations were terrestrial mammals of 23 species and 35 observations of 6 species were bats. Fifty-two percent of these captures were deer mice, a common and widespread species. Other abundant species captured included the least chipmunk (23 individuals), western

jumping mouse (*Zapus princeps*, 19) and montane vole (20). CURE was somewhat more poorly known (62% of species documented) than its neighbor to the west, BLCA, although early work by Durrant and Robinson (1962) provided useful information on the park's mammals.

Species richness was greatest for bats at Rainbow Lake Recreation Area (waypoint CU005A), east Elk Creek (CU010A), and SE Rainbow (CU014A) where 3 species were captured at each location. For terrestrial mammals, species richness was greatest at 1.7 km S of Soap Creek Campground in the meadow (RCU13A, B) and Ponderosa Pine Campground (RCU15A, B) where 5 species were captured at each.

At CURE, rodents (77% of likely species documented) and shrews (60%) were well documented but other groups, especially carnivores (38%), needed additional work. We documented 38% of bats likely to occur, but our ability to document more may have been hindered by the abundance of water (in the reservoir) and a paucity of usable netting sites remote from the reservoir.

2002. We documented 51 mammals at CURE during 2002, consisting of 3 species of bats, 6 rodents, 7 carnivores, and 2 artiodactyls. Effort included 4 visits, 9 person-days, 70 trap-nights, 9 mist net-nights, 2.3 acoustic survey hours, and a distance of 150.6 km in track-scat surveys. Occurrences new for 2002 were Hopi chipmunk (*E. rufus*), raccoon, and ringtail. A search of park observation files revealed the presence of five additional species.

Species richness was greatest at Gate View (waypoint CU002A) where 6 species of bats were documented. The most commonly encountered species were deer mice (37% of individuals documented) and coyote (12%). Each of the other species comprised less than 6% of observations.

Summary. We believe documentation exists for 80% of mammal species likely to occur at CURE. Although some surveys had been conducted at CURE (e.g., Durrant and Robinson 1962; 14 species), our work has confirmed the presence of 25 species (of the expected 59). While most groups are moderately well-documented, only 57% of predicted bats (n = 14) have been documented, in spite of using both mist nets and bat detectors. Improving this percentage will be a modest challenge given the general absence of good netting sites away from the reservoir. Intensive use of bat detectors is an alternative methodology to document additional species of bats on the park. For most other groups of mammals on the park, additional work is unlikely to yield more than one or two species per group (Table 29).

Fossil Butte National Monument

2001. At FOBU we mist-netted a total of 9 nights and amassed a total of 1,448 trap-nights. These efforts resulted in the capture or observation of 36 bats of 8 species and 189 terrestrial mammals of 19 species. Clark's (1977) earlier work at FOBU provided some baseline information for this park; he reported capturing or observing about 23 species, many of which we captured or observed in 2001. Clark used snap traps rather than live traps and caught only 2 species of rodents, deer mice and least chipmunks. The deer mouse comprised 49% of our captures. The second most abundant species we encountered was the least

chipmunk (47 captures). Additionally, we believed that we detected silver-haired bat (*Lasionycteris noctivagans*), western small-footed myotis, big brown bat, Townsend's big-eared bat and Brazilian free-tailed bat during acoustic surveys; these observations need to be verified by voucher specimens.

Species richness for locations inventoried for bats was greatest at the beaver ponds in "Moose Bones" canyon (waypoint FO002A) and the ponds in "Murder Hill" canyon (FO006A), where 7 species were documented. Species richness for terrestrial mammals was greatest in the grassy areas along Fossil Lake trail (RFO21), where 7 species were captured.

Lagomorphs (75% of likely species documented), rodents (86%) and artiodactyls (100%) are relatively well documented at FOBU. However, insectivores (0%), bats (53%), and carnivores (33%) required additional work.

2002. Effort at FOBU included 28 person-days, 280 trap-nights, 17 mist net-nights, 12.5 acoustic survey-hours, 51.9 km in track-scat surveys, and 5 visits during which 146 mammals of 23 species were documented. Five new occurrences were recognized during 2002 which were not observed during the 2001 inventory: masked shrew (*Sorex cinereus*), yellow pine chipmunk (*E. amoenus*), bobcat, mountain lion, and red fox.

Species richness for locations inventoried for bats was greatest at the beaver ponds in "Moose Bones" canyon (waypoint FO002A), where 7 species were documented. For locations inventoried for terrestrial mammals, species richness was greatest south of the Fossil Lake trailhead (RFO01A, RFO01B), where 6 species were captured. Deer mice and little brown bats were the most commonly encountered species at FOBU during 2002, comprising 22% and 21% of individuals observed, respectively. Least chipmunks were also relatively common and accounted for 10% of individuals.

Summary. The level of documentation at FOBU is currently 84%, an improvement of 15% over 2001. The groups with the lowest level of documentation are insectivores (50% but only 2 species expected), bats (69%, 13 species expected), and carnivores (73%, 11 species expected). Additional work on bats, using both mistnetting and bat detectors, may eventually add 4 more species; observational or camera work may add an additional 3 species of carnivores (Table 30). Thanks to the efforts of Ted Rado (1977), former park employee in the 1970s, specimens of several species that we did not encounter were available for examination in the park collection. Dorn et al. (1984) also provided important information.

Golden Spike National Historic Site

2001. We are not aware of previous work on mammals at GOSP. We netted for bats one night, with no captures, and conducted acoustic surveys on 2 nights, when we recorded 6 species. We also recovered 2 bat carcasses, big brown bat and western pipistrelle, under a great horned owl roost. We amassed a total of 863 trap-nights during which we captured or observed 102 individuals of 14 terrestrial mammal species. Rodent captures were primarily deer mice, but also included Ord's kangaroo rat (*Dipodomys ordii*), Great Basin pocket mouse, western harvest mouse (*Reithrodontomys megalotis*) and meadow vole (*M. pennsylvanicus*). We also captured bushy-tailed woodrats in the rocky outcrops.

We tallied a total of 80 species of mammals that might occur in the vicinity, only 55 of which seemed somewhat likely given the small size and linear nature of the park. We suspected that our list of “likely” species was still too large, but using that number (55) we tabulated that only 36% of mammals had been documented at the park. All groups required additional attention at this park but it seemed likely that many species on our list might not occur on the park.

Species richness was greatest at an alcove near the Big Fill trail (waypoint GO005A), where 9 species were documented with acoustic surveys, traplines, and from bones recovered from owl pellets. The greatest number of species actually captured was at Blue Creek (RGO17), where 4 species were captured.

2002. We invested 18 person-days, 345 trap-nights, 6 mist net-nights, 7.6 acoustic survey-hours, and 54.1 km in track-scat surveys at GOSP during 2002. Eleven species were documented including one bat, one lagomorph, 5 rodents, and 4 carnivores. Six species were unique to the 2002 inventory: western small-footed myotis, black-tailed jackrabbit (*Lepus californicus*), muskrat, bobcat, mountain lion, and raccoon. One additional species was added from park observation files, striped skunk (*Mephitis mephitis*). We also recorded little brown bat during acoustic surveys.

Species richness for locations inventoried for bats was greatest at the canyon SW of the Last Cut trailhead (waypoint GO002A), where 3 species were documented by acoustic surveys. Species richness for locations inventories for terrestrial mammals was greatest on traplines set near the visitor center (RGO04; RGO05), where 3 species were captured on each trapline. Deer mice were the most prolific species at GOSP during 2002, comprising 53% of individuals observed. The next most abundant species was the Great Basin pocket mouse, accounting for less than 8% of individuals.

Summary. Using an adjusted database of predicted species (43), we were able to document 42% of mammal species in 2001 and 67% of species at the end of 2002. This figure is comparable to documentation levels at CEBR, HOVE, and PISP after two years of effort. At GOSP, groups still requiring additional work are insectivores (0% but our predicted figure of 5 species may be too high), bats (57%), and lagomorphs (60%). Acquiring additional records of bats will be difficult at this park and may best be done with intensive work with echolocation detectors. Shrews and lagomorphs should be documented with specimens where possible. Additional effort on rodents and carnivores should eventually document 3 and 2 species respectively (Table 31).

Hovenweep National Monument

2001. We surveyed all seven units at HOVE for a total of 5 mist net-nights and 2,016 trap-nights. We captured 39 individuals of 6 bat species. Acoustic surveys did not yield any new bat species. Almost half of the bat captures were fringed myotis (*M. thysanodes*). Piñon mice dominated terrestrial mammal captures.

Species richness for locations inventoried for bats was greatest at Square Tower group, Ruin Canyon (waypoint RHO47) and the canyon at Hackberry unit (RHO31) where 5 species were documented. Species richness for locations inventoried for terrestrial mammals was greatest at Hackberry unit in the upland juniper woodland (RHO32A, B) and in the canyon (RHO29), Holly unit in the canyon bottom (RHO 34, RHO36) and juniper uplands (RHO35), and in the Cajon unit in the sagebrush uplands (RHO48) where 4 species were captured on each trapline.

Overall, about 45% of the species likely occurring at HOVE were documented, with fair proportions of lagomorphs (67%) and rodents (60%) documented. Additional work was required on the other groups in 2002 together with renewed attempts to be more critical in predicting the number of species that likely occur at the park.

2002. One hundred eighty-eight mammals were captured or observed at HOVE, consisting of 6 species of bats, 2 lagomorphs, 9 rodents, 6 carnivores, and one artiodactyl. Our efforts included 5 visits during which we worked 23 person-days, 540 trap-nights, 6 mist net-nights, 21.0 acoustic survey-hours, and 8.9 km in track-scat surveys. Newly documented species were Botta's pocket gopher (*T. bottae*), Ord's kangaroo rat (*Dipodomys ordii*), white-tailed antelope squirrel, bushy-tailed woodrat (*N. cinerea*), raccoon, ringtail, western spotted skunk (*Spilogale gracilis*), and mule deer (*Odocoileus hemionus*). Additionally, 3 species were added to the species from park observation files: long-tailed weasel, badger, and striped skunk.

Species richness for locations sampled for bats was greatest at the spring in Ruin Canyon, Square Tower Group (waypoint HO003A) and in the canyon on Hackberry Unit (HO004A) where 6 bat species were documented at each site. Species richness for locations sampled for terrestrial mammals was greatest in the area 0.54 km E of the visitor center, N of the campground (RHO2A, RHO2B; RHO2A, RHO3B), where 4 species were captured on each trapline. The most abundant species we encountered at HOVE during 2002 was fringed myotis, comprising 29% of observations. Other abundant species included California myotis (15%), western small-footed myotis (10%), and piñon mice (10%).

Summary. We believe documentation exists for 37 of 53 (71%) predicted species at HOVE. For a two-year effort at a park with seven relatively small and fragmented units, this may be "as good as it gets." This is one park where nearly all groups would profit from additional work, assuming that our current list of predicted species is close to reality. There may be up to three species of shrews at the park that would be susceptible to pitfall traps. For bats, there are few places to mistnet at HOVE and acoustic surveys have not yielded species beyond those mistnetted (Table 32). HOVE may be more depauperate in terms of bats than we currently predict. Additional work on rodents and carnivores could add up to 7 new species. This is another park where Ted Rado was an employee in the 1970s and he documented (1975) several species of mammals for the park. Unfortunately, we have been unable to determine if any specimens were saved from his work, although we know he saved amphibians and reptiles from the park that are now housed at the California Academy of Sciences.

Pipe Spring National Monument

2001. We captured or observed a total of 181 mammals of 24 species during a total of 4 mist net-nights and 360 trap-nights. Bats accounted for nearly one-half of the captures, with a total of 90 individuals of 10 species netted or recorded acoustically. Captures were dominated by the pallid bat (*Antrozous pallidus*) and western pipistrelle. We also captured several lactating Allen's big-eared bats (*Idionycteris phyllotis*), which suggested that a maternity colony might be nearby. Other mammals captured were deer mice, brush mice, piñon mice, western harvest mice and desert woodrat (*N. lepida*).

The bats (59% of likely species), rodents (76%) and lagomorphs (50%) were reasonably well known, but no information was available on other species on the park; overall, about 50% of likely species were documented.

The location sampled for bats, which resulted in the highest species richness was at the ponds near the Winsor Castle (waypoint PI001A), where 8 species were documented. The location sampled for terrestrial mammals, which resulted in the highest species richness was the escarpment and marshy area around West Cabin Spring (RPI09), where 7 species were captured.

2002. During our second year of fieldwork at PISP, we made 4 visits and accrued 14 person-days, 324 trap-nights, 6 mist-net nights, 8.6 acoustic survey-hours, and 1.6 km in track-scat surveys. We captured or observed 6 species of bats, one lagomorph, 10 rodents, and 2 carnivores. Of note during inventories at PISP was the documentation of 5 new species: desert cottontail (*Sylvilagus audubonii*), cliff chipmunk (*E. dorsalis*), Cactus mouse (*Peromyscus eremicus*), bobcat, and coyote. We also recorded echolocation calls of little brown bat and hoary bat, the occurrence of which needs to be verified with voucher specimens. We also included the presence of gray fox from park observation files.

Species richness for locations sampled for bats was highest at the ponds near Winsor Castle (waypoint PI001A) where 10 species were documented. Species richness for locations sampled for terrestrial mammals was greatest along the SW boundary fence line (RPI02A, RPI02B) and around Winsor Castle (RPI03), where 7 species were captured on each trapline. Pallid bats were the most common species captured at PISP during 2002, accounting for over 14% of individuals. Piñon mice were also relatively common, consisting of almost 10% of captures.

Summary. Overall documentation of mammals at PISP is 68% and is helped to some extent by records in Hoffmeister (1986). Bats (80%) and rodents (89%) are moderately well-documented, other groups less so. Mistnetting in spring or fall may add 2 or 3 additional species of bats. Outside of artiodactyls and insectivores, which we predict have relatively few species on the monument, carnivores are the most poorly-documented group (44% of a predicted 9 species; Table 33). We suspect the reality is that our list of predicted carnivores is still too inclusive and that in fact few, if any, carnivores are truly resident on the park. Were we to reduce the number of carnivores to those known (4), documentation on the park would increase to 76%.

Timpanogos Cave National Monument

2001. In 2001, using 646 trap-nights and 30 person days, we documented a total of 54 individuals of 17 species; 4 species were actually captured, the others were observations or acoustic recordings of bats. Sixty-three percent of the captures were deer mice, followed by bushy-tailed woodrat (4 individuals), Uinta chipmunks (3), and a western harvest mouse (1). Thirteen additional species were documented from observation by our efforts or those of park staff. Only about 28% of likely mammals were documented.

Species richness for locations sampled for bats was greatest on the paved trail (waypoint TI009A), where 6 species were detected during acoustic surveys. The location sampled for terrestrial mammals that resulted in the highest species richness was also along the paved trail (RTI10), where 4 species were captured. For four groups, level of documentation was: bats, 46%, rodents, 32%; carnivores, 14%; and artiodactyls, 50%.

2002. Efforts at TICA resulted in the capture or observation of 74 mammals including 3 species of bats, 9 rodents, 3 carnivores, and 2 artiodactyls. We visited the monument 7 times, during which we worked 35 person-days, 559 trap-nights, 11 mist net-nights, 13.3 acoustic survey-hours, and 141.0 km in track-scat surveys. Twelve species were unique to the 2002 inventory: long-eared myotis, Yuma myotis, Townsend's big-eared bat (*Corynorhinus townsendii*), cliff chipmunk, least chipmunk, red squirrel, western jumping mouse, coyote, mountain lion, striped skunk, elk (*Cervus elaphus*), and moose (*Alces alces*). Additionally, we included 9 species from park museum specimens or observation files: vagrant shrew, snowshoe hare, northern flying squirrel, American black bear, raccoon, long-tailed weasel, western spotted skunk, and bobcat.

Species richness for locations sampled for bats was highest at the American Fork River at the E park boundary (waypoint TI006A), where 6 species were documented using mist nets and acoustic surveys. Species richness for locations sampled for terrestrial mammals was highest near the residence area and water tank (RTI01, RTI02) and near the maintenance area and resource building ("Rock House"; RTI04), where 3 species were captured on each trapline.

Deer mice were the most abundant species encountered at TICA during 2002, and accounted for 43% of observations. Long-eared myotis were the next most common species and comprised 8% of observations.

Summary. Level of documentation for mammals at TICA is 74%, with rodents, carnivores, and artiodactyls at 80% or greater. This is another park, like CURE and GOSP for which bats appear to be "under-documented." TICA provides considerable potential habitat for roosting bats, and is known to have provided more habitat prior to development of the cave systems that are now the focus of the park. Nonetheless, sampling bats at TICA has been challenging as there are few really good places to mistnet; not surprisingly, acoustic sampling has provided most of our records for bats at the park. Although additional acoustic sampling can be done, we predict it will be a slow process to acquire additional species. Insectivores are also undersampled at TICA but documentation of shrews other than opportunistically, will also require considerable labor and time, especially in the rocky soils that characterize this park (Table 34).

The Challenge of Species Documentation on National Parks

Our efforts to document mammalian species on parklands within a two-year period should be viewed as a work in progress. This is because several factors affect these efforts. One especially problematic area is exactly what list of species should be used as the measuring stick against which documentation is assessed. We have chosen to use a list of species that we deem “likely” to occur, based on our work, our knowledge of mammals of the Colorado Plateau, and pertinent references. These “likely” species are those listed as “Present” or “Probably Present” on the Master Species Lists. For some parks, perhaps especially small parks, our lists are still somewhat too inclusive. For larger parks, we suspect that the current lists are probably good “working” lists, at least at this point in time. Those parks that have some demonstrated level of previous work are those parks that are closest to 90% level of documentation (BLCA, CARE, CURE, and FOBU). The combination of multiple years of effort by previous investigators (e.g., Ted Rado at both FOBU and HOVE) and the presence of knowledgeable park staff has helped us to reach this level of documentation.

Our estimates for inventory completeness after two years of effort differ considerably from those used by the NCPN as “starting points” for this inventory effort (NPS NCPN Proposal 2000) and not always in the expected direction. These figures (NPS estimate, followed by our final estimate) for the nine parks are: BLCA, 80%, 83%; CARE, 65-70%, 87%; CEBR, 80%, 64%; CURE, 75%, 81%; FOBU, 80%, 84%; GOSP, 50%, 66%; HOVE, 75%, 71%; PISP, 20%, 68%; TICA, 50-60%, 74%. The source of the original estimates is unknown but it was probably local park staff. We believe that most parks initially overestimated the extent of documentation, may have worked from a smaller, less-inclusive list than we are using (small, poorly-known and secretive mammals such as bats and small rodents frequently were overlooked), and were often unaware of previous work as it is not always well-documented in park files.

Park size undoubtedly influences species diversity and a variety of mathematical algorithms incorporate size in attempting to predict the numbers of species (but not actual species) that may occur on a park. After two years of effort, our results at documenting species occurrence on NCPN parks is lowest for the smaller parks (CEBR, GOSP, HOVE, PISP, and TICA; all less than 2500ha in size, range of documentation: 64-74%; Fig. 1). At some of these parks, we exceeded our estimated allotted person-days of effort in 2001, often to no seeming avail. The level of documentation at the smallest park, PISP (16ha, 68%), is fair, partly because of our success at documenting bats and rodents there and partly because of the existence of a good recent treatment of mammals in Arizona (Hoffmeister 1986) that allows us to construct a more meaningful list of likely species (no such work is available for Utah mammals). The remaining small park is HOVE (318ha, 71%) where good results with rodents and lagomorphs, and secondarily with bats and carnivores, have bolstered our efforts there.

Conversely, documentation levels are highest for the four largest parks (all larger than 3300ha, range of documentation: 81-87%). We would predict more species of mammals at larger parks but it is not clear to us whether documentation would be predicted to be “easier” on large parks. Factors that may be important in higher levels of documentation at large

parks may be greater habitat diversity that perhaps leads to more places that can be sampled (e.g., pools for mistnetting bats), larger populations of some species (especially resident carnivores) that might make them relatively easier to document, a tendency to attract researchers who initiated studies that document mammals, and a greater likelihood that there will be resident NPS naturalists or biologists.

One factor in assessing species occurrence is the biology of the animals that we are trying to document. It is an axiom in biology that only a few species are truly common and most others are much less common to rare. The occurrence of common, widespread, and abundant species, such as *P. maniculatus* (760 individuals captured in 2001; 29% of all animals captured or observed in two years), is easy to document and our results offer visible proof of this. However, less common and rare species can be very difficult to document and absolute absence is difficult to prove. Another biological phenomenon that can affect the results of our inventory attempts is whether or not the populations of certain species fluctuate over time. It was our opinion, gained after working many years on the Colorado Plateau, that rodent populations were relatively low, especially in Utah. Concurrent work using the same methodology in New Mexico, Colorado, Wyoming, and Nebraska all suggested that rodent populations were higher in those areas. Climate, especially precipitation, also interacts with species biology in influencing population levels of rodents.

Aspects of climate and especially availability of water affect our ability to inventory some small mammals (especially bats) and interact with features of biology of each species. Bats are dependent on the availability of roosting sites, water sources, and adequate prey. The extent of available water in a given area, as well as subtleties of pond shape and size, can affect capture success of bats (Kunz and Kurta 1988, K. N. Geluso personal communication). Typically, captures of bats in mist nets are lower when water is abundant, as the bats seem to be more dispersed over the landscape. When water sources are fewer, bats tend to concentrate at those waterholes that are available (mammalogists exploit this tendency when possible).

In general, our level of effort for rodent trapping exceeded the mist-netting effort. This is because, relatively speaking, mist-net sites are limited in occurrence and outnumbered by available trapping locations. Nonetheless, it is not uncommon for the number of bats captured in a given night to exceed the number of rodents captured. For example, at PISP we captured 82 bats in a total of 4 mist-net nights versus 91 rodents captured in 360 trap nights. This occurrence likely reflects the limited extent of available water in the area as well as the occurrence of good roosting habitat in nearby cliffs.

Other more proximate factors that may interfere with inventory efforts include inclement weather, which can depress activity of small mammals (and mammalogists) and the efficiency of methods used to inventory them. Rainfall can dissolve bait, cause traps to trigger, and turn mist nets into soggy, non-functional curtains. Portions of GOSP burned prior to our visit in 2001 and we do not know how, or if, that influenced our results at that park. Likewise, subtle seasonal changes in species natural history or the physical environment may influence our activities.

We have included “species-accumulation curves” for all parks where we worked (Figs. 2-10). We do not find these curves especially informative or meaningful as they relate only to our own inventory efforts in 2001 and 2002 with no recognition given to previous work at the parks, some of which added appreciably to overall documentation. In addition, different groups are sampled by different methods and with differing levels of effort (e.g., bats can be sampled in a few hours with nets or detectors, rodents in traps set for at least one or more nights, and carnivores by varying periods of hiking and observation). Thus, combining results of these methodologies as we have done for “terrestrial mammals” is likely inappropriate. Nonetheless, they provide some “feel” for time involved in documenting species on the parks. In many cases, the curves continue to rise over time, suggesting that considerable documentation remains to be done (i.e., the asymptote has not been reached; Scott, 1994) and this is probably true. In other cases, the curves appear to be “leveling off,” suggesting that an asymptote has been approached, if not reached. In most cases the cumulative number of species is somewhere between 15 to 25 species, about half the total number of species documented or predicted on these parks.

Conclusions and Recommendations

In conclusion, we have found the task of documenting 90% of expected species of mammals on nine national parks within a two-year period much more daunting than we originally envisioned. As others have noted, “proving” that a species doesn’t occur is extremely difficult; to some extent, that is now what is required. We have documented the easier, perhaps more common species, been relatively successful at documenting less common species, and now at each park typically have an additional 10-15 species of the total expected that we have been unable to document. Probably not all these 10-15 species occur on any one park but finding those that do will require effort beyond the two-year duration of our work. Our comments in the summary for each park note those groups for which we think some additional work would be fruitful and provides some idea of the difficulty of that task. As noted above, the groups requiring documentation vary from park to park. For the nine parks, insectivore documentation varies from 0 to 100%, bats from 57 to 100%, lagomorphs from 0 to 75%, carnivores from 44 to 93%, and artiodactyls from 0 to 100%.

If it is important to document the remaining species, careful thought should be given to the following:

- a) inventories are different than monitoring and the two should not be confused;
- b) inventories require specialists who are familiar with the region and its species;
- c) a standard museum voucher specimen is the only evidence that is unequivocal;
- d) species, especially those rare and uncommon ones still needing documentation, are unlikely to be found as a result of random surveys;
- e) levels of precision for associated data (e.g., GPS coordinates) should be determined in advance and with thought given to the mobility of the species;
- f) sufficient time must be allocated to accomplish the task;
- g) sufficient funding must be allocated to accomplish the task;
- h) the overall task should be realistic, given available time and funding, and investigators should not be saddled with a plethora of additional tasks (e.g., database

building, photography, etc.) that may have little or no bearing on their primary task of an inventory of a given group of species;

i) by definition, inventories of groups of organisms on national parks is a “field” task; investigators should not have to choose between spending time in the field versus spending time in the office.

We have been asked to provide our comments on the next phase of this program, namely monitoring. We are aware that intensive discussions have already occurred on this topic and will keep our comments to a minimum. We encourage parks and networks to consider assigning priority for monitoring to:

a) species known to be declining on the basis of statistically defensible trend data, where such data exist;

b) species that are unique to a given park, or a region within which a park occurs;

c) areas or habitats that are unique to a park, especially those areas that appear to have high biological diversity (noted in text and tables in this report).

Acknowledgments

A number of people were instrumental in helping us with the work reported herein. G. Alban, D. Chavez, J. Erickson, L. Garcia, L. Harding, T. Hayward, J. Journey, T. Mollhagen, C. Ramotnik, R. Rodriguez, E. Taylor, and C. Weiss helped conduct field inventories. Brief biographic materials are in the Appendix for the more experienced members of our crews. D. Worthington, K. Stahlnecker, S. Robinson, R. Wilson, A. Bornemeier, D. Judd, M. Gosse, V. Santucci, C. Kite, and others provided logistical support and assistance at the various parks. Angie Evenden and Margaret Beer kept us in touch with network office needs and facilitated acquisition of permits for work at the parks. State collecting permits were provided by the states of Utah, Arizona, and Colorado. J.C. Richardson of USGS helped with administrative support during the first year of the study.

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Table 1. Locations sampled on BLCA during 2001 mammal inventory. Location ID was not used during 2001 therefore a description of the location is given.

Location	Waypoint name	UTM (NAD27)		Date(s) visited	Sampling method(s)	No. of species (animals)	Observer(s)
north rim, pond in drainage by Dead Horse Trail, 1.4 mi SW Poison Spring Hill	BL01A	267621	4269497	08/08/01	mist net, acoustic	8 (9)	E. Valdez, R. Rodriguez
north rim, pond 2.5 mi NE ranger station	BL02A	267183	4277049	08/10/01	mist net, acoustic	6 (7)	E. Valdez, R. Rodriguez
Dead Horse spring	BL03A	267904	4271158	08/09/01	mist net, acoustic	6 (12)	E. Valdez, R. Rodriguez
campground	BL04A	263968	4274039	08/07/01	acoustic	2	E. Valdez, R. Rodriguez
East Portal Campground	RBL01A	269128	4267571	07/22/01	trapline	2 (3)	D. Chavez
East Portal Campground	RBL01B	269178	4267826	07/22/01			D. Chavez
East Portal Campground	RBL02A	269154	4267896	07/22/01	trapline	2 (3)	E. Taylor
East Portal Campground	RBL02B	268972	4268101	07/22/01			E. Taylor
S. Rim Road, w of VC 0.2 mi to Oak Flat Loop	RBL03A	265606	4270322	07/24/01	trapline	1 (4)	E. Taylor
S. Rim Road, w of VC 0.2 mi to Oak Flat Loop	RBL03B	265475	4270550	07/24/01			E. Taylor
S. Rim Road, w of VC 0.2 mi to Oak Flat Loop	RBL04A	265607	4270276	07/24/01	trapline	0	D. Chavez
S. Rim Road, w of VC 0.2 mi to Oak Flat Loop	RBL04B	265470	4269926	07/24/01			D. Chavez
S rim, between Devils Outlook and Rock Point (WP7-WP8)	RBL05A	264124	4272502	07/24/01	trapline	3 (9)	C. Ramotnik

Table 1. Continued.

Location	Waypoint name	UTM (NAD27)		Date(s) visited	Sampling method(s)	No. of species (animals)	Observer(s)
S rim, between Devils Outlook and Rock Point (WP7-WP8)	RBL05B	264147	4272472	07/24/01			C. Ramotnik
S. rim, along fenceline, S. of road to VC	RBL06A	263900	4272667	07/24/01	trapline	1 (7)	M. Bogan
S. rim, along fenceline, S. of road to VC	RBL06B	263664	4272866	07/24/01			M. Bogan
cedar point	RBL07A	263040	4273079	07/25/01	trapline	4 (6)	C. Ramotnik
cedar point	RBL07B	262393	4273209	07/25/01			C. Ramotnik
High Point picnic area loop	RBL08A	261199	4271551	07/25/01	trapline	3 (10)	D. Chavez
High Point picnic area loop	RBL08B	261210	4271583	07/25/01			D. Chavez
Warner Point Nature Trail, W end of S. Rim Road	RBL09A	260907	4271634	07/25/01	trapline	4 (11)	E. Taylor
Warner Point Nature Trail, W end of S. Rim Road	RBL09B	260617	4271736	07/25/01			E. Taylor
High Point	RBL10A	261212	4271579	07/25/01	trapline	2 (4)	M. Bogan
High Point	RBL10B	261195	4271490	07/25/01			M. Bogan
campground, canyon rim, and Chasm View Trail	RBL11A	263945	4274098	08/09/01	trapline	4 (7)	D. Chavez
campground, canyon rim, and Chasm View Trail	RBL11B	263968	4273930	08/09/01			D. Chavez
N Rim campground, east from Chasm View Nature Trail	RBL12A	264131	4273833	08/09/01	trapline	4 (16)	E. Taylor

Table 1. Continued.

Location	Waypoint name	UTM (NAD27)		Date(s) visited	Sampling method(s)	No. of species (animals)	Observer(s)
N Rim campground, east from Chasm View Nature Trail	RBL12B	264312	4274014	08/09/01			E. Taylor
N Vista Tr, ca. 0.25 mi NW ranger station	RBL13A	264113	4274551	08/06/01	trapline	5 (13)	E. Taylor
N Vista Tr, ca. 0.25 mi NW ranger station	RBL13B	263808	4272528	08/06/01			E. Taylor
N rim, lower end Grizzly Gulch	RBL14A	265140	427436	08/04/01	trapline	2 (4)	C. Ramotnik
N rim, lower end Grizzly Gulch	RBL14B	264946	4273815	08/04/01			C. Ramotnik
N rim, lower end Grizzly Gulch	RBL15A	265113	4274075	08/04/01	trapline	2 (4)	M. Bogan
N rim, lower end Grizzly Gulch	RBL15B	264892	4273857	08/04/01			M. Bogan
North rim, the Narrows overlook	RBL16A	265011	4273303	08/09/01	trapline	2 (5)	C. Ramotnik
North rim, the Narrows overlook	RBL16B	264884	4273145	08/09/01			C. Ramotnik
N rim, Long Gulch, 1.5 mi (by rd) SE ranger station	RBL17A	265548	4273210	08/05/01	trapline	3 (13)	C. Ramotnik
N rim, Long Gulch, 1.5 mi (by rd) SE ranger station	RBL17B	265413	4272985	08/05/01			C. Ramotnik
N rim, Long Gulch, 1.5 mi (by rd) SE ranger station	RBL18A	265548	4273234	08/05/01	trapline	5 (12)	M. Bogan
N rim, Long Gulch, 1.5 mi (by rd) SE ranger station	RBL18B	265299	4273163	08/05/01			M. Bogan
N Rim, Rocky A-B	RBL19A	265648	4272805	08/06/01	trapline	3 (17)	M. Bogan
N Rim, Rocky A-B	RBL19B	265544	4272700	08/06/01			M. Bogan

Table 1. Continued.

Location	Waypoint name	UTM (NAD27) Easting Northing		Date(s) visited	Sampling method(s)	No. of species (animals)	Observer(s)
3.3 mi SE ranger station (by road) between island peaks and kneeling camel	RBL20A	266319	4271951	08/08/01	trapline	2 (11)	M. Bogan
3.3 mi SE ranger station (by road) between island peaks and kneeling camel	RBL20B	266113	4271854	08/08/01			M. Bogan
old road on E side of N. Rim Rd, just S of dry dirt tank, well-worn foot-trail, bottom of draw	RBL21A	266215	4271701	08/08/01	trapline	5 (8)	C. Ramotnik
old road on E side of N. Rim Rd, just S of dry dirt tank, well-worn foot-trail, bottom of draw	RBL21B	266221	4271901	08/08/01			C. Ramotnik
abandoned dirt road NW of turn-around loop near Kneeling Camel View	RBL22A	266175	4271973	08/05/01	trapline	2 (12)	D. Chavez
abandoned dirt road NW of turn-around loop near Kneeling Camel View	RBL22B	265892	4272219	08/05/01			D. Chavez
turn around loop se of kneeling camel view	RBL23A	266987	4271166	08/05/01	trapline	7 (10)	E. Taylor
turn around loop se of kneeling camel view	RBL23B	267115	4271091	08/05/01			E. Taylor

Table 1. Continued.

Location	Waypoint name	UTM (NAD27) Easting Northing		Date(s) visited	Sampling method(s)	No. of species (animals)	Observer(s)
above, around, and below pond on Deadhorse Trail ca. 1 mi	RBL24A	267914	4271006	08/08/01	trapline	1 (4)	D. Chavez
above, around, and below pond on Deadhorse Trail ca. 1 mi	RBL24B	267868	4271196	08/08/01			D. Chavez
gulch above pond, and gulch below pond at Deadhorse Trail; 1.4 MI sw Poison Spring Hill	RBL25A	267563	4269356	08/08/01	trapline	1 (1)	E. Taylor
gulch above pond, and gulch below pond at Deadhorse Trail; 1.4 MI sw Poison Spring Hill	RBL25B	267671	4269612	08/08/01			E. Taylor
w side grizzly gulch	RBL30A	265897	4276081	08/07/01	trapline	2 (12)	D. Chavez
w side grizzly gulch	RBL30B	265622	4276034	08/07/01			D. Chavez
w side grizzly gulch	RBL31A	265968	4276067	08/07/01	trapline	5 (18)	E. Taylor
w side grizzly gulch	RBL31B	266250	4276274	08/07/01			E. Taylor
"shady draw"	RBL32A	267748	4275690	08/07/01	trapline	1 (1)	M. Bogan
"shady draw"	RBL32B	267656	4276056	08/07/01			M. Bogan
corral, near N boundary	RBL33	268555	4276963	08/07/01	trapline	3 (15)	M. Bogan
3.7 mi E on dirt road from camp	RBL34A	268540	4276894	08/06/01	trapline	2 (13)	D. Chavez
3.7 mi E on dirt road from camp	RBL34B	268266	4276716	08/06/01			D. Chavez
3.7 mi E on dirt road from camp	RBL35	268858	4277066	08/06/01	trapline	2 (14)	C. Ramotnik
3 mi NNE North Rim Ranger Station	RBL36A	268285	4277114	08/07/01	trapline	2 (16)	M. Bogan

Table 1. Continued.

Location	Waypoint name	<u>UTM (NAD27)</u>		Date(s) visited	Sampling method(s)	No. of species (animals)	Observer(s)
		Easting	Northing				
3 mi NNE North Rim Ranger Station	RBL36B	267829	4277125	08/07/01			M. Bogan
Island Parks Overlook, 2.9 mi SE Ranger Station	RBL37A	265785	4272096	08/09/01	trapline	2 (2)	M. Bogan
Island Parks Overlook, 2.9 mi SE Ranger Station	RBL37B	265695	4271971	08/09/01			M. Bogan
2.8 mi NE (by rd) Ranger Station	BL06A	267403	4276662	08/08/01	opportunistic	1 (1)	D. Chavez
bobcat sighting	BL05A	269614	4277411	08/07/01	opportunistic	1 (1)	M. Bogan

Table 2. Locations sampled on CARE during 2001 mammal inventory. Location ID was not used during 2001 therefore a description of the location is given.

Location	Waypoint name	UTM (NAD27) Easting Northing	Date(s) visited	Sampling method(s)	Number of species (animals)	Observer(s)
Ackland Spring	CR002A	478987 4255160	06/15/01	mist net, acoustic	8 (75)	E. Valdez, R. Rodriguez
Deep Creek, 0.7 mi S, 0.57 mi E Deep Creek Spring	CR005A	464050 4253253	06/16/01	mist net	3 (12)	E. Valdez, R. Rodriguez
Fremont River just off park road	CR006A	478473 4237217	06/20/01	mist net, opportunistic, acoustic	9 (1)	E. Valdez, R. Rodriguez
0.5 mi S of Cedar Mesa Campground	CR007A	492960 4205670	06/17/01	mist net, opportunistic, acoustic	9 (9)	E. Valdez, R. Rodriguez
Halls Creek narrows	CR008A	509499 4164132	07/12/01	mist net	6 (25)	E. Valdez, R. Rodriguez
Halls Creek N of Narrows	CR009A	509997 4164840	07/11/01	mist net	6 (11)	E. Valdez, R. Rodriguez
Oak Creek dam	CR010A	487980 4214856	06/13/01	mist net	7 (11)	E. Valdez, R. Rodriguez
Onion Beds	CR011A	491773 4197692	06/18/01	mist net	7 (32)	E. Valdez, R. Rodriguez
W of Oak Creek Dam	CR012A	487444 4215056	06/14/01	mist net	5 (13)	E. Valdez, R. Rodriguez
big horn sheep	CR013A	503682 4175855	02/10/01	opportunistic	1 (1)	D. Worthington
Middle Desert Wash	CR014A	468874 4259402	06/14/01	mist net	1 (1)	E. Valdez, R. Rodriguez
1.5 mi S Baker Ranch, T26 R5E Sec29 NW by road	CR015A	465648 4263951	06/15/01	opportunistic	1 (1)	E. Valdez, R. Rodriguez
dumpster behind visitor center	CR016A	477136 4237979	07/01/01	opportunistic	1 (1)	D. Worthington

Table 2. Continued.

Location	Waypoint name	UTM (NAD27) Easting Northing	Date(s) visited	Sampling method(s)	Number of species (animals)	Observer(s)
drainage south of deep creek	RCR01	463292 4253235	06/17/01	trapline	4 (1)	S. Haymond
drainage south of deep creek	RCR02	463486 4253235	06/17/01	trapline	1 (1)	G. Alban
Deep Creek, near west park boundary	RCR03	463848 4253313	06/16/01	trapline	1 (1)	T. Hayward
Deep Creek, near west park boundary	RCR04	463871 4253352	06/16/01	trapline	1 (1)	G. Alban
Petroglyph Barn	RCR05	478679 4237613	06/20/01	trapline	2 (3)	J. Erickson
Jones Bench	RCR06	465941 4263232	06/14/01	trapline	3 (9)	S. Haymond
Jones Bench	RCR06	465941 4263232	06/15/01	trapline		S. Haymond
Jones Bench	RCR07	465945 4263251	06/14/01	trapline	3 (7)	T. Hayward
Jones Bench	RCR07	465945 4263251	06/15/01	trapline		T. Hayward
Jones Bench	RCR08	466628 4263157	06/14/01	trapline	5 (8)	G. Alban
Jones Bench	RCR08	466628 4263157	06/15/01	trapline		G. Alban
Jones Bench	RCR09	466612 4263160	06/14/01	trapline	1 (4)	S. Haymond
Jones Bench	RCR09	466612 4263160	06/15/01	trapline		S. Haymond
drainage south of deep creek	RCR10	463304 4253253	06/17/01	trapline	1 (1)	J. Erickson, T. Hayward, J. Jurney
Halls Creek N of Narrows	RCR11	509926 4164837	07/10/01	trapline	5 (8)	E. Valdez, R. Rodriguez
Oak Creek, near E park boundary	RCR12	487523 4215042	06/12/01	trapline	1 (1)	T. Hayward

Table 2. Continued.

Location	Waypoint name	<u>UTM (NAD27)</u> Easting Northing		Date(s) visited	Sampling method(s)	Number of species (animals)	Observer(s)
Oak Creek, near E park boundary	RCR13	486254	4215098	06/13/01	trapline	2 (4)	G. Alban
Oak Creek, near E park boundary	RCR14	487081	4215130	06/12/01	trapline	1 (5)	J. Erickson
Oak Creek, near E park boundary	RCR15	487078	4215084	06/12/01	trapline	2 (3)	G. Alban
Oak Creek, near E park boundary	RCR16	487037	4215131	06/12/01	trapline	2 (3)	S. Haymond
Oak Creek, near E park boundary	RCR17	488544	4214447	06/12/01	trapline	2 (7)	G. Alban, J. Erickson
Oak Creek, near E park boundary	RCR18	486385	4215188	06/13/01	trapline	1 (3)	J. Journey
Oak Creek, near E park boundary	RCR19	486396	4215194	06/13/01	trapline	1 (3)	T. Hayward
Onion Beds	RCR20	491708	4197656	06/18/01	trapline	3 (13)	J. Erickson
Onion Beds	RCR20	491708	4197656	06/19/01	trapline		J. Erickson
Onion Beds	RCR21	491818	4197703	06/18/01	trapline	3 (18)	T. Hayward
Onion Beds	RCR21	491818	4197703	06/19/01	trapline		T. Hayward
Onion Beds	RCR22	491912	4197774	06/18/01	trapline	1 (18)	G. Alban
Onion Beds	RCR22	491912	4197774	06/19/01	trapline		G. Alban
Onion Beds	RCR23	491808	4197694	06/18/01	trapline	1 (3)	G. Alban, S. Haymond
Onion Beds	RCR23	491808	4197694	06/19/01	trapline		G. Alban, S. Haymond

Table 2. Continued.

Location	Waypoint name	UTM (NAD27) Easting Northing	Date(s) visited	Sampling method(s)	Number of species (animals)	Observer(s)
Deep Creek, near west park boundary	RCR24	463872 4253357	06/16/01	trapline	2 (4)	J. Erickson
Onion Beds	RCR25	491753 4197498	06/18/01	trapline	3 (4)	S. Haymond
Onion Beds	RCR25	491753 4197498	06/19/01	trapline		S. Haymond
Onion Beds	RCR26	491739 4197676	06/18/01	trapline		J. Journey
Onion Beds	RCR26	491739 4197676	06/19/01	trapline		J. Journey
Oxbow	RCR27	485887 4237571	06/20/01	trapline	1 (4)	G. Alban
Oxbow	RCR28	485887 4237553	06/20/01	trapline	1 (2)	S. Haymond
Oxbow	RCR29	485914 4237291	06/20/01	trapline	1 (2)	T. Hayward
Oxbow	RCR30	485935 4237322	06/20/01	trapline	1 (3)	J. Journey
Deep Creek, near west park boundary	RCR31	463811 4253328	06/16/01	trapline	0	J. Journey
Jones Bench	RCR32	466032 4263219	06/14/01	trapline	0	J. Journey
Jones Bench	RCR32	466032 4263219	06/15/01	trapline		J. Journey
Jones Bench	RCR33	466085 4263219	06/14/01	trapline	0	J. Journey
Jones Bench	RCR33	466085 4263219	06/15/01	trapline		J. Journey
Oak Creek, near E park boundary	RCR34	486080 4215163	06/13/01	trapline	0	J. Erickson
Oak Creek, near E park boundary	RCR35	486007 4215291	06/13/01	trapline	0	S. Haymond
Oak Creek, near E park boundary	RCR36	487511 4215029	06/12/01	trapline	0	J. Journey

Table 2. Continued.

Location	Waypoint name	<u>UTM (NAD27)</u>		Date(s) visited	Sampling method(s)	Number of species (animals)	Observer(s)
		Easting	Northing				
Oak Creek, near E park boundary	RCR37	486863	4215093	06/13/01	trapline	0	S. Haymond
Oxbow	RCR38	485900	4237495	06/20/01	pitfalls	0	G. Alban, S. Haymond
Deep Creek, near E park boundary	RCR39	463787	4253278	06/16/01	trapline	0	S. Haymond

Table 3. Locations sampled on CEBR during 2001 mammal inventory. Location ID was not used during 2001 therefore a description of the location is given.

Location	Waypoint name	UTM (NAD27)		Date visited	Sampling method(s)	No. of species (animals)	Observer(s)
		Easting	Northing				
pond 0.1 mi W hwy 143 and 148 junction	CE001A	338763	4168762	07/15/01	mist net, acoustic	5 (5)	E. Valdez, R. Rodriguez
Alpine Pond	CE002A	339055	4166804	07/14/01	mist net, acoustic	4 (1)	E. Valdez, R. Rodriguez
0.25 mi SW Alpine Pond, upper Alpine Pond trail	CE007A	338662	4166520	07/11/01	opportunistic	2 (2)	G. Alban
Alpine Pond trail rock slope	CE008A	339204	4167325	07/17/01	trapline	1 (1)	S. Haymond, T. Hayward
0.2 mi N of Chessman Overlook, DOR Hwy 148	CE009A	339031	4166531	07/15/01	opportunistic	1 (1)	E. Valdez, R. Rodriguez
meadow below and E of campground	CE010A	338565	4163927	07/12/01	opportunistic	1 (1)	S. Haymond
ca. 3 mi N of campground on hwy 148 just past Alpine Pond parking area, on E side of road	CE011A	339401	4167503	07/15/01	opportunistic	1 (1)	S. Haymond, T. Hayward
near south entrance	CE012A	336685	4163556	July	opportunistic	1 (1)	M. Johnson
W boundary along Ashdown Creek	CE013A	333222	4166816	09/05/01	opportunistic	1	S. Haymond, D. Chavez
campground	CE014A	338511	4163966	07/15/01	opportunistic	1 (1)	S. Haymond
on hwy 148	CE015A	339311	4166921	07/15/01	opportunistic	1 (1)	S. Haymond
Adams Canyon	RCE09A	335999	4167151	09/05/01	trapline	3 (4)	S. Haymond, D. Chavez
Adams Canyon	RCE09B	336155	4167226	09/05/01			S. Haymond
Adams Canyon	RCE10A	335851	4167019	09/05/01	trapline	1 (5)	D. Chavez

Table 3. Continued.

Location	Waypoint name	UTM (NAD27)		Date visited	Sampling method(s)	No. of species (animals)	Observer(s)
		Easting	Northing				
Alpine Pond trail, upper and lower, and rocky slope	RCE11A	339121	4167235	09/09/01	trapline	3 (5)	D. Chavez
Alpine Pond trail, upper and lower, and rocky slope	RCE11B	339228	4167439	09/09/01			D. Chavez
alpine pond and talus slope	RCE12	339142	4166869	07/17/01	trapline	5 (9)	T. Hayward
alpine pond and talus slope	RCE12	339142	4166869	07/18/01	trapline		T. Hayward
alpine pond and talus slope	RCE13	339101	4166868	07/17/01	trapline	2 (7)	S. Haymond
alpine pond and talus slope	RCE13	339101	4166868	07/18/01	trapline		S. Haymond
Alpine Pond trail, upper and lower, and rocky slope	RCE14A	339304	4167309	09/09/01	trapline	4 (5)	S. Haymond
Alpine Pond trail, upper and lower, and rocky slope	RCE14B	339241	4167445	09/09/01			S. Haymond
confluence of Ashdown and Rattle Creeks	RCE15	335132	4166875	07/11/01	trapline	4 (17)	T. Hayward
confluence of Ashdown and Rattle Creeks	RCE15	335132	4166875	07/12/01	trapline		T. Hayward
confluence of Ashdown and Rattle Creeks	RCE16	335135	4166883	07/11/01	trapline	2 (8)	S. Haymond
confluence of Ashdown and Rattle Creeks	RCE16	335135	4166883	07/12/01	trapline		S. Haymond
confluence of Ashdown and Rattle Creeks	RCE17	335157	4166854	07/11/01	trapline	2 (5)	J. Journey

Table 3. Continued.

Location	Waypoint name	UTM (NAD27)		Date visited	Sampling method(s)	No. of species (animals)	Observer(s)
		Easting	Northing				
confluence of Ashdown and Rattle Creeks	RCE17	335157	4166854	07/12/01	trapline		J. Journey
confluence of Ashdown and Rattle Creeks	RCE18	335132	4166801	07/11/01	trapline	3 (18)	G. Alban
confluence of Ashdown and Rattle Creeks	RCE18	335132	4166801	07/12/01	trapline		G. Alban
Ashdown Creek	RCE19A	335255	4166566	09/07/01	trapline	2 (4)	S. Haymond
Ashdown Creek	RCE19B	335557	4166501	09/07/01			S. Haymond
Ashdown Creek	RCE20A	335253	4166705	09/07/01	trapline	2 (5)	D. Chavez
Ashdown Creek	RCE20B	335478	4166623	09/07/01			D. Chavez
Point Supreme Campground and picnic area	RCE21A	338490	4164061	09/11/01	trapline	3 (7)	S. Haymond
Point Supreme Campground and picnic area	RCE21B	338475	4164251	09/11/01			S. Haymond
Point Supreme Campground and picnic area	RCE22A	338444	4164229	09/11/01	trapline	1 (3)	D. Chavez
Point Supreme Campground and picnic area	RCE22B	338408	4163963	09/11/01			D. Chavez
Meadows at North Boundary	RCE23	337725	4169709	07/15/01	trapline	1 (1)	G. Alban, S. Haymond, T. Hayward, J. Journey
Meadows at North Boundary	RCE24	337771	4169710	07/15/01	trapline	1 (1)	G. Alban, S. Haymond, T. Hayward, J. Journey

Table 3. Continued.

Location	Waypoint name	UTM (NAD27)		Date visited	Sampling method(s)	No. of species (animals)	Observer(s)
		Easting	Northing				
Meadows at North Boundary	RCE25	337734	4169626	07/15/01	trapline	1 (1)	G. Alban, S. Haymond, T. Hayward, J. Journey
Meadows at North Boundary	RCE26	338155	4169736	07/13/01	trapline	2 (5)	G. Alban
Meadows at North Boundary	RCE26	338155	4169736	07/14/01	trapline		G. Alban
Meadows at North Boundary	RCE27	338363	4169643	07/13/01	trapline	1 (2)	J. Journey
Meadows at North Boundary	RCE27	338363	4169643	07/14/01	trapline		J. Journey
Meadows at North Boundary	RCE28	337869	4169740	07/13/01	trapline	2 (10)	T. Hayward
Meadows at North Boundary	RCE28	337869	4169740	07/14/01	trapline		T. Hayward
Meadows at North Boundary	RCE29	337867	4169728	07/13/01	trapline	1 (5)	S. Haymond
Meadows at North Boundary	RCE29	337867	4169728	07/14/01	trapline		S. Haymond
ca. 1 mi W of Rattlesnake Trailhead	RCE30A	336989	4169762	09/09/01	trapline	1 (6)	D. Chavez
ca. 1 mi W of Rattlesnake Trailhead	RCE30B	337267	4169774	09/09/01			D. Chavez
ca. 1 mi W of Rattlesnake Trailhead	RCE31A	336976	4169754	09/08/01	trapline	4 (8)	S. Haymond
ca. 1 mi W of Rattlesnake Trailhead	RCE31B	337139	4169634	09/08/01			S. Haymond
ranger office	RCE32	337872	4163857	09/10/01	trapline	2 (6)	S. Haymond
pond w of hwy 148/143 junction (panguitch turn off)	RCE33	338760	4168763	07/17/01	trapline	2 (2)	J. Journey
pond w of hwy 148/143 junction (panguitch turn off)	RCE33	338760	4168763	07/18/01	trapline		J. Journey
pond w of hwy 148/143 junction (panguitch turn off)	RCE34	338751	4168763	07/17/01	trapline	3 (3)	G. Alban
pond w of hwy 148/143 junction (panguitch turn off)	RCE34	338751	4168763	07/18/01	trapline		G. Alban

Table 3. Continued.

Location	Waypoint name	UTM (NAD27)		Date visited	Sampling method(s)	No. of species (animals)	Observer(s)
		Easting	Northing				
pumphouse	RCE35	337109	4163646	07/19/01	trapline	1 (2)	S. Haymond
pumphouse	RCE36	337102	4163656	07/19/01	trapline	1 (1)	G. Alban
Rattle Creek upstream from junction of Rattle Creek and Adams Canyon	RCE37A	335782	4166973	09/06/01	trapline	2 (6)	S. Haymond
Rattle Creek upstream from junction of Rattle Creek and Adams Canyon	RCE37B	3336003	4167043	09/06/01			S. Haymond
Rattle Creek upstream from junction of Rattle Creek and Adams Canyon	RCE38A	336057	4167138	09/06/01	trapline	2 (6)	D. Chavez
Rattle Creek upstream from junction of Rattle Creek and Adams Canyon	RCE38B	336023	4166982	09/06/01			D. Chavez
residence, maintenance area, forrest surrounding	RCE39	338024	4163963	07/19/01	trapline	4 (12) 1 (7)	T. Hayward
Ranger residence	RCE40	337843	4163833	09/10/01	trapline		D. Chavez
Visitor Center	RCE41A	337919	4164191	09/10/01	trapline	3 (11)	S. Haymond
Visitor Center	RCE41B	338014	4164213	09/10/01			S. Haymond
Visitor Center	RCE42A	337885	4164193	09/10/01	trapline	2 (3)	D. Chavez
Visitor Center	RCE42B	337818	4162461	09/10/01			D. Chavez
on hwy near campground	RCE43	338667	4164719	07/15/01	trapline	3 (7)	J. Journey
on hwy near campground	RCE43	338667	4164719	07/16/01	trapline		J. Journey
Breaks Rim, 1km N of Camp West of HWY 174	RCE44	338655	4164718	07/15/01	trapline	2 (7)	G. Alban
Breaks Rim, 1km N of Camp West of HWY 174	RCE44	338655	4164718	07/16/01	trapline		G. Alban

Table 3. Continued.

Location	Waypoint name	UTM (NAD27)		Date visited	Sampling method(s)	No. of species (animals)	Observer(s)
		Easting	Northing				
Breaks Rim, 1km N of Camp West of HWY 154	RCE45	338598	4164721	07/15/01	trapline	6 (23)	S. Haymond
Breaks Rim, 1km N of Camp West of HWY 154	RCE45	338598	4164721	07/16/01	trapline		S. Haymond
Breaks Rim, 1km N of Camp West of HWY 188	RCE46	338641	4164692	07/15/01	trapline	3 (5)	T. Hayward
Breaks Rim, 1km N of Camp West of HWY 188	RCE46	338641	4164692	07/16/01	trapline		T. Hayward
residence, maintenance area, forrest surrounding	RCE47	338033	4163921	07/19/01	trapline	0	J. Journey
Meadows at North Boundary	RCE48	337750	4169743	07/15/01	trapline	0	G. Alban, S. Haymond, T. Hayward, J. Journey
West of meadows at N boundary, in forest	RCE49	337512	4169710	07/15/01	trapline	0	S. Haymond, T. Hayward

Table 4. Locations sampled on CURE during 2001 mammal inventory. Location ID was not used during 2001 therefore a description of the location is given.

Location	Waypoint name	UTM (NAD27)		Date(s) visited	Sampling method(s)	No. of species (animals)	Observer(s)
		Easting	Northing				
Lake Fork Gunnison River by Gateview campground	CU003A	303882	4251327	08/13/01	mist net	1 (1)	M. Bogan
Gunnison National Forest, ponds 0.5 mi S Rainbow Lake	CU004A	310255	4277204	08/11/01	mist net, acoustic	2 (7)	E. Valdez, R. Rodriguez
Rainbow Lake RA., mile 6	CU005A	312283	4268821	07/18/01	mist net	3 (11)	K.
upper Chance Creek	CU006A	298082	4266076	07/21/01	mist net	2 (3)	E. Valdez, R. Rodriguez
by highway and Pine Creek	CU007A	295720	4257925	07/21/01	opportunistic	1 (1)	M. Bogan
Highway and Dry Gulch	CU008A	0309149	4261313	07/17/01	mist net	1 (3)	M. Bogan
Ferros trading post	CU009A	298109	4261491	07/21/01	opportunistic	1 (1)	M. Bogan
East Elk Creek	CU010A	310857	4262093	07/21/01	mist net, opportunistic	3 (7)	M. Bogan
East Elk Creek	CU011A	310870	4261995	07/21/01	opportunistic	1	M. Bogan
Visitor Center	CU012A	311089	4259619	07/21/01	opportunistic	2 (2)	M. Bogan
	CU013A	268110	4267375	07/21/01	opportunistic	1 (1)	M. Bogan
SE Rainbow	CU014A	310778	4277160	08/12/01	mist net, acoustic	3 (6)	E. Valdez, R. Rodriguez
	CU015A	317116	4261716	07/21/01	opportunistic	1	M. Bogan
5 mi up Red Canyon rd	CU016A			07/21/01	opportunistic	1 (1)	P. Reynolds
Neversink	RCU01A	324414	4264711	07/17/01	trapline	2 (5)	C. Ramotnik
Neversink	RCU01B	324687	4264765	07/17/01			C. Ramotnik

Table 4. Continued.

Location	Waypoint name	UTM (NAD27)		Date(s) visited	Sampling method(s)	No. of species (animals)	Observer(s)
		Easting	Northing				
Cooper Ranch	RCU02A	323471	4263670	07/17/01	trapline	2 (4)	C. Ramotnik
Cooper Ranch	RCU02B	323405	4263512	07/17/01			C. Ramotnik
Cooper Ranch	RCU03A	323435	4263482	07/17/01	trapline	3 (11)	M. Bogan
Cooper Ranch	RCU03B	323490	4263676	07/17/01			M. Bogan
ca. 1.5 mi E of camp on hwy 50, W of entrance road to Dry Creek	RCU04A	312787	4260054	07/17/01	trapline	2 (23)	D. Chavez
ca. 1.5 mi E of camp on hwy 50, W of entrance road to Dry Creek	RCU04B	312494	4260047	07/17/01			D. Chavez
E OF road to shore of the lake, ca 1.5 mi e of camp on hwy 50	RCU05A	312799	4260068	07/17/01	trapline	2 (19)	E. Taylor
E OF road to shore of the lake, ca 1.5 mi e of camp on hwy 50	RCU05B	313009	4260217	07/17/01			E. Taylor
East Elk Creek-CAR's rocky pinnacles	RCU06A	310982	4262078	07/16/01	trapline	2 (6)	C. Ramotnik
East Elk Creek-CAR's rocky pinnacles	RCU06B	311015	4261935	07/16/01			C. Ramotnik
East Elk Creek-along creek/riparian	RCU07A	310847	4262127	07/16/01	trapline	3 (25)	M. Bogan
East Elk Creek-along creek/riparian	RCU07B	310848	4261929	07/16/01			M. Bogan
hill west of Dry Gulch Campground	RCU08A	309108	4261672	07/16/01	trapline	4 (23)	D. Chavez
hill west of Dry Gulch Campground	RCU08B	308959	4261733	07/16/01			D. Chavez
near Dry Gulch Campground	RCU09A	309093	4261752	07/17/01	trapline	3 (14)	T. Mollhagen
near Dry Gulch Campground	RCU09B	309181	4261456	07/17/01			T. Mollhagen

Table 4. Continued.

Location	Waypoint name	UTM (NAD27)		Date(s) visited	Sampling method(s)	No. of species (animals)	Observer(s)
		Easting	Northing				
E canyon face beside Dry Gulch Campground	RCU10A	309193	4261644	07/16/01	trapline	4 (30)	E. Taylor
E canyon face beside Dry Gulch Campground	RCU10B	309223	4261715	07/16/01			E. Taylor
Dry Gulch Campground	RCU11A	308970	4262380	07/17/01	trapline	3 (9)	T. Mollhagen
Dry Gulch Campground	RCU11B	309005	4262108	07/17/01			T. Mollhagen
0.7 mi W (by road) Dry Gulch (draw)	RCU12A	307820	4261599	07/18/01	trapline	4 (16)	D. Chavez
0.7 mi W (by road) Dry Gulch (draw)	RCU12B	307653	4261933	07/18/01			D. Chavez
1.7 km S Soap Creek CG, meadow	RCU13A	297971	267055	07/19/01	trapline	5 (36)	M. Bogan, T. Mollhagen
1.7 km S Soap Creek CG, meadow	RCU13A	297971	267055	07/20/01			M. Bogan, T. Mollhagen
1.7 km S Soap Creek CG, meadow	RCU13A	297971	267055	07/21/01			M. Bogan, T. Mollhagen
1.7 km S Soap Creek CG, meadow	RCU13B	297975	4266836	07/19/01			M. Bogan, T. Mollhagen
1.7 km S Soap Creek CG, meadow	RCU13B	297975	4266836	07/20/01			M. Bogan, T. Mollhagen
1.7 km S Soap Creek CG, meadow	RCU13B	297975	4266836	07/21/01			M. Bogan, T. Mollhagen
Ponderosa Pine Campground	RCU14A	298665	4266315	07/19/01	trapline	3 (7)	D. Chavez

Table 4. Continued.

Location	Waypoint name	UTM (NAD27)		Date(s) visited	Sampling method(s)	No. of species (animals)	Observer(s)
		Easting	Northing				
Ponderosa Pine Campground	RCU14B	298452	4266189	07/19/01			D. Chavez
Ponderosa Pine Campground	RCU15A	298695	4266097	07/19/01	trapline	5 (18)	C. Ramotnik
Ponderosa Pine Campground	RCU15B	298750	4266187	07/19/01			C. Ramotnik
Ponderosa Pine Campground	RCU16A	298460	4266462	07/19/01	trapline	3 (9)	E. Taylor
Ponderosa Pine Campground	RCU16B	298332	4267062	07/19/01			E. Taylor
upper Chance Creek	RCU17A	297794	4265910	07/20/01	trapline	4 (6)	D. Chavez
upper Chance Creek	RCU17B	297603	4265728	07/20/01			D. Chavez
upper Chance Creek	RCU18A	298150	4265931	07/20/01	trapline	2 (4)	E. Taylor
upper Chance Creek	RCU18B	297902	4265763	07/20/01			E. Taylor
upper Chance Creek	RCU19A	297770	4266260	07/20/01	trapline	1 (3)	C. Ramotnik
upper Chance Creek	RCU19B	297760	4266388	07/20/01			C. Ramotnik
Pine Creek-along river trail	RCU20A	295415	4258370	07/18/01	trapline	1 (5)	C. Ramotnik
Pine Creek-along river trail	RCU20B	294973	4258422	07/18/01			C. Ramotnik
Pine Creek	RCU21A	295504	4257486	07/18/01	trapline	3 (8)	M. Bogan
Pine Creek	RCU21B	294970	4258423	07/18/01			M. Bogan
Pine Creek, east side of dirt road	RCU22A	295367	4258070	07/18/01	trapline	4 (10)	D. Chavez
Pine Creek, east side of dirt road	RCU22B	295483	4257702	07/18/01			D. Chavez
SW of Blue Mesa Res., S of dirt road, N or hwy 50	RCU23A	295509	4257424	07/18/01	trapline	4 (17)	E. Taylor
SW of Blue Mesa Res., S of dirt road, N or hwy 50	RCU23B	295718	4257240	07/18/01			E. Taylor
East Portal Campground	RCU24A	269060	4267364	07/22/01	trapline	2 (2)	D. Chavez

Table 4. Continued.

Location	Waypoint name	UTM (NAD27)		Date(s) visited	Sampling method(s)	No. of species (animals)	Observer(s)
		Easting	Northing				
East Portal Campground	RCU24B	269057	4267426	07/22/01	trapline	3 (9)	D. Chavez
Along Gunnison river ca. 1.5-2 mi w of Crystal Dam	RCU25A	269187	4266916	07/22/01			M. Bogan, C. Ramotnik
Along Gunnison river ca. 1.5-2 mi w of Crystal Dam	RCU25B	269367	4266812	07/22/01			M. Bogan, C. Ramotnik
nw East Portal Campground ca. 1 mi	RCU26A	268613	4267304	07/23/01	trapline	1 (2)	D. Chavez, E. Taylor
nw East Portal Campground ca. 1 mi	RCU26B	268620	4267169	07/23/01			D. Chavez, E. Taylor
nw East Portal Campground ca. 1 mi	RCU26C	268846	4267187	07/23/01	trapline	3 (4)	D. Chavez, E. Taylor
oak draw west of East Portal campground	RCU27A	268691	4267263	07/23/01	trapline	3 (6)	M. Bogan, C. Ramotnik
oak draw west of East Portal campground	RCU27B	268853	4267386	07/23/01			M. Bogan, C. Ramotnik
oak draw west of East Portal campground	RCU27C	268858	4267231	07/23/01	trapline	2 (6)	M. Bogan, C. Ramotnik

Table 5. Locations sampled on FOBU during 2001 mammal inventory. Location ID was not used during 2001 therefore a description of the location is given.

Location	Waypoint name	UTM (NAD27)		Date(s) visited	Sampling method(s)	No. of species (animals)	Observer(s)
millet canyon upper pond	FO001A	517997	4636117	08/12/01	mist net, acoustic	4 (1)	G. Alban, S. Haymond, T. Hayward, J. Journey
moose bones beaver ponds	FO002A	520161	4634708	08/09/01	mist net, acoustic	7 (7)	G. Alban, S. Haymond, T. Hayward, J. Journey
Fossil lake trail, lower beaver pond	FO004A	518525	4635273	08/08/01	mist net, acoustic	4 (3)	S. Haymond
near Fossil lake trail parking area	FO005A	518144	4634078	08/15/01	opportunistic	1 (1)	S. Haymond
murder hill pond	FO006A	519673	4636572	08/11/01	mist net, acoustic	7 (7)	G. Alban, S. Haymond, T. Hayward, J. Journey
ca. 3/4 mi s of turnoff to camp (BLM ridge)	FO007A	518200	4637308	08/08/01	opportunistic	1 (1)	S. Haymond
on north park road	FO008A	518598	4636781	08/09/01	opportunistic	1 (1)	S. Haymond
north end of park road	FO009A	518602	4636067	08/10/01	opportunistic	1 (1)	S. Haymond
s end of monumet near random points 98 and 100	RFO08	520690	4629928	08/10/01	trapline	2 (7)	G. Alban
Rubey ridge	RFO09	517053	4637035	08/12/01	trapline	2 (13)	G. Alban
cundick ridge	RFO10	519051	4635233	08/09/01	trapline	3 (12)	S. Haymond
cundick ridge	RFO11	518942	4635453	08/09/01	trapline	2 (4)	T. Hayward
murder hill ridge	RFO12	519650	4636110	08/11/01	trapline	2 (7)	S. Haymond
murder hill ridge	RFO13	519727	4636105	08/11/01	trapline	2 (6)	T. Hayward

Table 5. Continued.

Location	Waypoint name	UTM (NAD27)		Date(s) visited	Sampling method(s)	No. of species (animals)	Observer(s)
		Easting	Northing				
south entrance, sagebrush and chicken creek	RFO14	519333	4630608	08/13/01	trapline	1 (3)	G. Alban
south entrance, sagebrush and chicken creek	RFO15	519410	4630616	08/13/01	trapline	1 (3)	S. Haymond
murder hill ridge	RFO16	518812	4636447	08/11/01	trapline	2 (4)	J. Journey
bull pen, west facing slope	RFO17	518178	4637962	08/07/01	trapline	1 (4)	T. Hayward
s end of monumet near random points 98 and 100	RFO18	522673	4630573	08/10/01	trapline	3 (22)	T. Hayward
fossil lake trail	RFO19	518614	4635238	08/08/01	trapline	3 (4)	T. Hayward
fossil lake trail	RFO20	518623	4635244	08/08/01	trapline	1 (2)	J. Journey
fossil lake trail	RFO21	518550	4635283	08/08/01	trapline	7 (19)	S. Haymond
campsite on BLM ridge	RFO22	516902	4638293	08/15/01	trapline	1 (1)	S. Haymond
fossil lake trail	RFO23	518792	4634911	08/08/01	trapline	3 (8)	G. Alban
random point #8	RFO24	518906	4636860	08/07/01	trapline	3 (4)	S. Haymond, J. Journey
cundick ridge	RFO25	519043	4635622	08/10/01	trapline, opportunistic	2 (2)	J. Journey
cundick ridge	RFO26	519009	4635592	08/09/01	trapline	2 (3)	G. Alban
Rubey ridge	RFO27	517117	4636951	08/12/01	trapline	2 (3)	S. Haymond
Rubey ridge	RFO28	517689	4636967	08/12/01	trapline	1 (3)	T. Hayward
murder hill ridge	RFO29	519627	4636203	08/11/01	trapline	2 (12)	G. Alban
Visitor Center	RFO30	519080	4631445	08/14/01	trapline	2 (20)	S. Haymond
Visitor Center	RFO31	519042	4631526	08/15/01	trapline	4 (10)	G. Alban, T. Hayward

Table 5. Continued.

Location	Waypoint name	<u>UTM (NAD27)</u>		Date(s) visited	Sampling method(s)	No. of species (animals)	Observer(s)
		Easting	Northing				
south entrance, sagebrush and chicken creek	RFO32	519668	4630709	08/13/01	trapline	2 (4)	T. Hayward, J. Journey
s end of monumet near random points 98 and 100	RFO33	522673	4630573	08/10/01	trapline	0	J. Journey
Rubey ridge	RFO34	517721	4636998	08/12/01	trapline	0	J. Journey
s end of monumet near random points 98 and 100	RFO35	520517	4630086	08/10/01	trapline	0	S. Haymond
bull pen, west facing slope	RFO36	518178	4637968	08/07/01	trapline	0	G. Alban

Table 6. Locations sampled on GOSP during 2001 mammal inventory. Location ID was not used during 2001 therefore a description of the location is given.

Location	Waypoint name	UTM (NAD27)		Date visited	Sampling method(s)	No. of species (animals)	Observer(s)
		Easting	Northing				
blue creek (thikol)	GO001A	379476	4614162	07/29/01	mist net, acoustic	4	S. Haymond
ranger's residence	GO004A	371411	4608328	08/02/01	mist net, acoustic	3	S. Haymond
alcove in burned area along big fill trail	GO005A	376068	4610767	08/01/01	trapline, acoustic, opportunistic	9 (7)	S. Haymond
1.5 mi E Big Fill trailhead, S of railroad grade	GO06A	377459	4611071	07/31/01	opportunistic	2 (2)	S. Haymond
canyon sw of last cut on east auto tour	RGO06	374754	4608977	07/29/01	trapline	2 (11)	G. Alban, T. Hayward
canyon sw of last cut on east auto tour	RGO06	374754	4608977	07/30/01	trapline		G. Alban, T. Hayward
chinaman's arch	RGO07	375857	4609346	07/31/01	trapline	3 (8)	J. Journey
chinaman's arch	RGO07	375857	4609346	08/01/01	trapline		J. Journey
sagebrush se of last cu, e of promontory road	RGO08	375759	4608540	07/29/01	trapline	2 (3)	S. Haymond
sagebrush se of last cu, e of promontory road	RGO08	375759	4608540	07/30/01	trapline		S. Haymond
chinaman's arch	RGO09	375744	4609458	07/31/01	trapline	2 (13)	s. Haymond
chinaman's arch	RGO09	375744	4609458	08/01/01	trapline		s. Haymond

Table 6. Continued.

Location	Waypoint name	UTM (NAD27)		Date visited	Sampling method(s)	No. of species (animals)	Observer(s)
		Easting	Northing				
rail road grade, heading west from visitor's center	RG010	370714	4608235	08/02/01	trapline	2 (7)	T. Hayward
grassy area, e end of east auto tour	RG011	375909	4610181	07/31/01	trapline	2 (7)	T. Hayward
grassy area, e end of east auto tour	RG011	375909	4610181	08/01/01	trapline		T. Hayward
grassy area, e end of east auto tour	RG012	375919	4610179	07/31/01	trapline	2 (8)	G. Alban
grassy area, e end of east auto tour	RG012	375919	4610179	08/01/01	trapline		G. Alban
visitor's center	RG013	370789	4608224	08/02/01	trapline	3 (11)	G. Alban
last cut trail head along the road	RG014	374907	4609413	07/31/01	trapline	1 (1)	G. Alban, S. Haymond, T. Hayward, J. Journey
ranger's residence	RG015	371377	4608337	07/30/01	trapline	3 (8)	J. Journey
sagebrush se of last cu, e of promontory road	RG016	375771	4608552	07/29/01	trapline	2 (2)	J. Journey
sagebrush se of last cu, e of promontory road	RG016	375771	4608552	07/30/01	trapline		J. Journey
blue creek (thikol)	RG017	379478	4614157	08/01/01	trapline	4 (15)	S. Haymond
blue creek (thikol)	RG017	379478	4614157	08/02/01	trapline		S. Haymond

Table 7. Locations sampled on HOVE during 2001 mammal inventory. Location ID was not used during 2001 therefore a description of the location is given.

Location	Waypoint name	UTM (NAD27)		Date visited	Sampling method(s)	No. of species (animals)	Observer(s)
Square Tower springs	HO003A	669940	4139145	06/26/01	mist net	4 (5)	S. Haymond, R. Rodriguez
Hackberry unit	HO004A	674867	4141741	06/29/01	mist net	3 (30)	S. Haymond
Cajon unit	HO005A	661018	4129407	06/27/01	mist net	2 (5)	G. Alban, J. Erickson, S. Haymond, J. Journey
McElmo canyon road	HO006A	678983	4133478	06/30/01	opportunistic	1 (1)	M. Bogan, S. Haymond
Cajon unit	RHO12	660966	4129422	06/27/01	trapline	1 (4)	G. Alban
Cajon unit	RHO13	660951	4129408	06/27/01	trapline	1 (1)	J. Journey
Cajon unit	RHO14	661002	4129365	06/27/01	trapline	1 (4)	J. Erickson
Square Tower Campground	RHO15	670944	4138653	07/04/01	trapline	1 (3)	J. Erickson
Square Tower Campground	RHO16	670914	4138689	07/04/01	trapline	3 (6)	J. Journey
Square Tower Campground	RHO17	670944	4139006	07/04/01	trapline	3 (9)	G. Alban
Square Tower Campground	RHO18	670636	4139016	07/04/01	trapline	1 (1)	S. Haymond
Cutthroat unit	RHO19	678518	4145695	07/03/01	trapline	2 (3)	J. Erickson
Cutthroat unit	RHO20	678535	4145786	07/03/01	trapline	1 (2)	J. Journey
Cutthroat unit	RHO21	678477	4145723	07/03/01	trapline	3 (6)	G. Alban
Cutthroat unit	RHO22	678542	4145842	07/03/01	trapline	1 (2)	S. Haymond
Goodman Point	RHO23	701128	4142471	06/30/01	trapline	1 (1)	S. Haymond
Goodman Point	RHO24	701374	4142602	06/30/01	trapline	3 (10)	G. Alban
Goodman Point	RHO24	701374	4142602	09/23/01	trapline		S. Haymond
Goodman Point	RHO25	701385	4142647	06/30/01	trapline	3 (4)	M. Bogan
Goodman point	RHO26	701364	4142860	6/302001	trapline	3 (5)	J. Erickson
Goodman point	RHO26	701364	4142860	09/23/01	trapline		D. Chavez
Hackberry unit	RHO27	675024	4141536	06/29/01	trapline	3 (5)	S. Haymond

Table 7. Continued.

Location	Waypoint name	UTM (NAD27)		Date visited	Sampling method(s)	No. of species (animals)	Observer(s)
		Easting	Northing				
Hackberry unit	RHO28	674906	4141786	06/29/01	trapline	1 (1)	J. Journey
Hackberry unit	RHO29	674858	4141743	06/29/01	trapline	4 (8)	J. Erickson
Hackberry unit	RHO30	674808	4141703	06/29/01	trapline	1 (6)	G. Alban
Hackberry unit	RHO31	674876	4141739	06/29/01	trapline, mist net	5 (27)	M. Bogan, S. Haymond
Hackberry unit	RHO31	674876	4141739	09/24/02	trapline, mist net		S. Haymond, D. Chavez
Hackberry unit	RHO32A	674776	4141533	09/24/01	trapline	4 (10)	S. Haymond
Hackberry unit	RHO32B	674936	4141793	09/24/01			S. Haymond
Holly unit	RHO33	673091	4140852	06/28/01	trapline	3 (4)	S. Haymond
Holly unit	RHO34	673488	4140823	09/25/01	trapline	4 (15)	G. Alban, S. Haymond
Holly unit	RHO35	673420	4140819	06/28/01	trapline	4 (8)	G. Alban, S. Haymond
Holly unit	RHO36	673091	4140780	06/28/01	trapline	4 (7)	J. Journey
Holly unit	RHO37	673346	4140775	06/28/01	trapline	2 (3)	J. Erickson
Holly unit	RHO38A	673488	4140823	09/25/01	trapline	2 (9)	D. Chavez
Holly unit	RHO38B	673346	4140574	09/25/01			D. Chavez
Horseshoe unit	RHO39	674443	4141834	07/03/01	trapline	3 (9)	S. Haymond
Horseshoe unit	RHO40	674340	4141834	07/03/01	trapline	2 (3)	J. Journey
Horseshoe unit	RHO41	674528	4141889	07/03/01	trapline	1 (2)	J. Erickson
Horseshoe unit	RHO42	674504	4141904	07/03/01	trapline	1 (2)	G. Alban
Horseshoe unit	RHO43	674304	4141683	09/24/01	trapline	3 (14)	S. Haymond
Horseshoe unit	RHO44A	674529	4141880	09/24/01	trapline	3 (10)	D. Chavez
Horseshoe unit	RHO44B	674472	4141581	09/24/01			D. Chavez
Square Tower Group, upland	RHO45	669998	4139071	06/26/01	trapline	1 (1)	J. Erickson

Table 7. Continued.

Location	Waypoint name	UTM (NAD27)		Date visited	Sampling method(s)	No. of species (animals)	Observer(s)
		Easting	Northing				
Square Tower Group, upland	RHO46	670013	4139008	06/26/01	trapline	1 (1)	S. Haymond
Square Tower Group, Ruin Canyon	RHO47	669960	4139201	06/26/01	trapline, mist net	5 (3)	R. Rodriguez, S. Haymond
Cajon unit	RHO48	660966	4129422	06/26/01	trapline	4 (10)	G. Alban
Square Tower unit, upland	RHO49	670173	4139145	06/26/01	trapline	1 (4)	J. Journey
Cajon unit	RHO50	660808	4129332	06/27/01	trapline	3 (7)	S. Haymond
Square Tower Campground	RHO51	670854	4138919	06/29/01	trapline	3 (5)	G. Alban, J. Erickson, S. Haymond, J. Journey
Goodman Point	RHO52	701419	4142586	06/30/01	Trapline	0	J. Journey

Table 8. Locations sampled on PISP during 2001 mammal inventory. Location ID was not used during 2001 therefore a description of the location is given.

Location	Waypoint name	UTM (NAD27)		Date visited	Sampling method(s)	No. of species (animals)	Observer(s)
		Easting	Northing				
Ponds	PI001A	345017	4080895	07/16/01	mist net, acoustic	8 (81)	E. Valdez, R. Rodriguez
Trough in corral	PI004A	345037	4080924	08/01/01	opportunistic	1 (1)	park employees
Top and down trail along escarpment	RPI05A	344933	4081032	09/12/01	trapline	5 (19)	S. Haymond
Top and down trail along escarpment	RPI05B	344823	4080988	09/12/01			S. Haymond
Garden	RPI06	345066	4080909	09/12/01	trapline	2 (10)	D. Chavez, S. Haymond
Marshy area around West Cabin Spring	RPI07A	344936	4080907	09/12/01	trapline	6 (12)	D. Chavez
Marshy area around West Cabin Spring	RPI07B	344936	4080867	09/12/01			D. Chavez
Outbuildings near corral	RPI08	345020	4080942	09/12/01	trapline	1 (2)	D. Chavez, S. Haymond
Escarpment and marshy area around West Cabin Spring	RPI09	344885	4080847	07/16/01	trapline	7 (25)	E. Valdez, R. Rodriguez
Top of mesa	RPI10	344895	4080984	07/17/01	trapline	6 (21)	E. Valdez, R. Rodriguez

Table 9. Locations sampled on TICA during 2001 mammal inventory. Location ID was not used during 2001 therefore a description of the location is given.

Location	Waypoint name	UTM (NAD27)		Date visited	Sampling method(s)	No. of species (animals)	Observer(s)
lower part of historic trail near west boundary	RTI08	439566	4476668	07/25/01	trapline	3 (7)	S. Haymond, T. Hayward
lower part of historic trail near west boundary	RTI08	439566	4476668	07/26/01	trapline		S. Haymond, T. Hayward
maintenance area	RTI09	439499	4476828	07/27/01	trapline, acoustic	2 (7)	S. Haymond, T. Hayward
maintenance area	RTI09	439499	4476828	07/28/01	trapline, acoustic		S. Haymond, T. Hayward
paved trail	RTI10	439738	4475575	07/27/01	trapline	4 (8)	J. Journey
paved trail	RTI10	439738	4475575	07/28/01	trapline		J. Journey
upper portion of old trail above paved trail, paved trail near halfway point	RTI11	439641	4476595	07/27/01	trapline	3 (4)	G. Alban
upper portion of old trail above paved trail, paved trail near halfway point	RTI11	439641	4476595	07/28/01	trapline		G. Alban
near rock house	RTI12	439590	4476861	07/27/01	trapline	1 (3)	S. Haymond, T. Hayward
near rock house	RTI12	439590	4476861	07/28/01	trapline		S. Haymond, T. Hayward
visitor center	RTI13	440280	447063	07/27/01	trapline, acoustic	1 (15)	S. Haymond, T. Hayward
visitor center	RTI13	440280	447063	07/28/01	trapline, acoustic		S. Haymond, T. Hayward
residence area	RTI14	440125	4477121	07/25/01	trapline	0	G. Alban, J. Journey
residence area	RTI14	440125	4477121	07/26/01	trapline		G. Alban, J. Journey

Table 9. Continued.

Location	Waypoint name	<u>UTM (NAD27)</u>		Date visited	Sampling method(s)	No. of species (animals)	Observer(s)
		Easting	Northing				
paved trail	TI009A	440092	4476967	07/28/01	opportunistic, acoustic	6	G. Alban, S. Haymond, T. Hayward, J. Journey
near rock house	TI010A	439590	4476861	unknown	opportunistic	1	park employees
above cave tour entrance	TI011A	439741	4476348	07/21/01	opportunistic	1 (1)	park employees
on gate to middle cave	TI012A	439816	4476414	unknown	opportunistic	1	park employees
on main canyon road	TI013A	439675	4476867	07/26/01	opportunistic	1 (1)	S. Haymond, T. Hayward

Table 10. Field schedule for 2001 mammal inventories, in chronological order, indicating dates, parks visited, observers, effort and sampling methods. Number of hours of acoustic surveys was not recorded and track-scat surveys for carnivores were not used during 2001.

Date(s)	Park visited	Observer(s)	Effort			Sampling method(s)
			Person days	Trap nights	Net nights	
12-20 June	CARE	G. Alban, J. Erickson, S. Haymond, T. Hayward, J. Journey, R. Rodriguez, E. Valdez	63	2297	50	Mist nets, acoustic surveys, traplines
26 June-4 July	HOVE	G. Alban, M. Bogan, J. Erickson, S. Haymond, J. Journey, R. Rodriguez	49	2107	5	Mist nets, traplines
11-12 July	CARE	R. Rodriguez, E. Valdez	4		8	Mist nets
11-19 July	CEBR	G. Alban, S. Haymond, T. Hayward, J. Journey, R. Rodriguez, E. Valdez	40	1471	7	Mist nets, acoustic surveys, traplines
16-23 July	CURE	M. Bogan, D. Chavez, T. Mollhagen, C. Ramotnik, E. Taylor	40	1709		traplines
16-17 July	PISP	R. Rodriguez, E. Valdez	8	160	4	Mist nets, acoustic surveys, traplines
22, 24-25 July	BLCA	M. Bogan, D. Chavez, C. Ramotnik, E. Taylor	12	290		traplines
24-28 July	TICA	G. Alban, S. Haymond, T. Hayward, J. Journey	20	646		Acoustic surveys, traplines

Table 10. Continued.

Date(s)	Park visited	Observer(s)	Effort			Sampling method(s)
			Person days	Trap nights	Net nights	
29 July-2 August	GOSP	G. Alban, S. Haymond, T. Hayward, J. Journey	36	863	1	Mist net, acoustic surveys, traplines
8-10 August	BLCA	R. Rodriguez, E. Valdez	6		12	Mist nets, acoustic surveys
4-9 August	BLCA	M. Bogan, D. Chavez, C. Ramotnik, E. Taylor	24	918		traplines
7-15 August	FOBU	G. Alban, S. Haymond, T. Hayward, J. Journey	52	2088	9	Mist nets, acoustic surveys, traplines
11-13 August	CURE	R. Rodriguez, E. Valdez	6		12	Mist nets, acoustic surveys
5-11 September	CEBR	D. Chavez, S. Haymond	14	704		traplines
12 September	PISP	D. Chavez, S. Haymond	2	200		traplines
23-25 September	HOVE	D. Chavez, S. Haymond	6	400		traplines

Table 11. Mammals observed or captured during 2001.

Species common name	Park Code									Total
	BLCA	CARE	CEBR	CURE	FOBU	GOSP	HOVE	PISP	TICA	
Masked shrew	1			3						4
Montane shrew			3							3
Northern water shrew				2						2
California myotis		21					7	5		33
Western small-footed myotis		3	2	1	3	3	2	5	1	20
Long-eared myotis	10	3	1	2	12		1			29
Little brown bat	4		2	12	8	3			1	30
Fringed myotis		4					18	9		31
Long-legged myotis	14	15	1	19	6			3	1	59
Yuma myotis	2	10						3		15
Myotis sp.	1						1			2
Silver-haired bat	1	39	2	7	1					50
Western pipistrelle		36				3	7	22		68
Big brown bat	3	10	1	1	2	2		1	1	21
Hoary bat	1	1								2
Spotted bat	1	4								5
Townsend's big-eared bat	1	13			2					16
Allen's big-eared bat		5						6		11
Pallid bat	4	29					4	36		73
Brazilian free-tailed bat	2	11	1		2				1	17
Big free-tailed bat	1	14							1	16

Table 11. Continued.

Species common name	Park Code									Total
	BLCA	CARE	CEBR	CURE	FOBU	GOSP	HOVE	PISP	TICA	
Desert cottontail		1					1			2
Nuttall's cottontail				1	1	1				3
Sylvilagus species						1				1
Black-tailed jack rabbit		1					1			2
White-tailed jack rabbit					1					1
Cliff chipmunk		1								1
Least chipmunk	24		18	23	47		4			116
Colorado chipmunk				6						6
Hopi chipmunk	3	3					3			9
Uinta chipmunk			62						3	65
Yellow-bellied marmot			1	2		1				4
Golden-mantled ground squirrel	2		1	2					1	6
Rock squirrel				2			1		1	4
Gunnison's prairie dog				1						1
Red squirrel			1	2						3
Botta's pocket gopher								1		1
Northern pocket gopher	1		5	1	1	1				9
Silky pocket mouse							2			2
Great Basin pocket mouse		37			3	17				57
Long-tailed pocket mouse								8		8
Ord's kangaroo rat		1				3				4
Beaver				1	1					2
Western harvest mouse						6	6	6	1	19

Table 11. Continued.

Species common name	Park Code									Total
	BLCA	CARE	CEBR	CURE	FOBU	GOSP	HOVE	PISP	TICA	
Brush mouse	34	7		5			50			96
Canyon mouse	3	14	16				12	13		58
Deer mouse	179	22	113	206	110	64	14	22	34	764
Pinon mouse	19	59					111	29		218
Peromyscus species	1	5						15		22
Northern grasshopper mouse		4			1					5
White-throated woodrat							2			2
Bushy-tailed woodrat	19		2	16	2	1			4	44
Desert woodrat		3						12		15
Mexican woodrat							28			28
Long-tailed vole			10	14	3	1				28
Montane vole	1		13	20	5	2				41
Meadow vole				16	1					17
Microtus species										1
Western jumping mouse				23	7					30
Porcupine			1		1					2
Coyote		1			1	1	1			4
Red fox							1			1
Gray fox		1								1
American black bear		1								1
Ringtail		1							1	2
Raccoon		1								1
Ermine			1		1					2

Table 11. Continued.

Species common name	Park Code									Total
	BLCA	CARE	CEBR	CURE	FOBU	GOSP	HOVE	PISP	TICA	
Long-tailed weasel						1				1
Mink									1	1
Badger			1			1				2
Mountain lion		1	1				1			3
Bobcat		1	1	1			1			4
Elk		1	1	1						3
Mule deer		1	1	1	1	1			1	6
Moose					1					1
Bighorn sheep		1		1						2
Pronghorn					1					1
Mountain goat									1	1
Total	332	386	262	347	225	113	279	181	54	2225

Table 12a. Level of documentation for major groups of mammals on BLCA and overall level of documentation for all mammals.

Order	Number sp. possible	Number sp. likely	<u>Number sp. present</u>		<u>Percent of likely sp.</u>	
			2001	2002	2001	2002
Insectivora	6	5	2	2	40	40
Chiroptera	16	16	14	14	88	88
Lagomorpha	4	3	1	1	33	33
Rodentia	25	18	13	16	72	89
Carnivora	20	14	5	13	36	93
Artiodactyla	4	3	2	3	67	100
Total	75	59	37	49	63%	83%

Table 12b. Level of documentation for major groups of mammals on CARE and overall level of documentation for all mammals.

Order	Number sp. possible	Number sp. likely	<u>Number sp. present</u>		<u>Percent of likely sp.</u>	
			2001	2002	2001	2002
Insectivora	6	2	2	2	100	100
Chiroptera	18	16	16	16	100	100
Lagomorpha	5	4	2	2	50	50
Rodentia	30	21	20	20	95	95
Carnivora	18	15	11	11	73	73
Artiodactyla	5	3	3	3	100	100
Total	82	61	54	54	89%	89%

Table 12c. Level of documentation for major groups of mammals on CEBR and overall level of documentation for all mammals.

Order	Number sp. possible	Number sp. likely	<u>Number sp. present</u>		<u>Percent of likely sp.</u>	
			2001	2002	2001	2002
Insectivora	4	4	1	1	25	25
Chiroptera	19	11	6	8	55	73
Lagomorpha	5	3	0	0	0	0
Rodentia	24	19	12	14	63	74
Carnivora	15	13	4	8	31	62
Artiodactyla	3	3	2	2	67	67
Total	70	53	25	33	47%	62%

Table 12d. Level of documentation for major groups of mammals on CURE and overall level of documentation for all mammals.

Order	Number sp. possible	Number sp. likely	<u>Number sp. present</u>		<u>Percent of likely sp.</u>	
			2001	2002	2001	2002
Insectivora	6	5	3	3	60	60
Chiroptera	16	14	6	8	43	57
Lagomorpha	4	3	2	2	67	67
Rodentia	24	22	17	21	77	95
Carnivora	20	13	5	11	38	85
Artiodactyla	4	3	3	3	100	100
Total	74	60	36	48	60%	80%

Table 12e. Level of documentation for major groups of mammals on FOBU and overall level of documentation for all mammals.

Order	Number sp. possible	Number sp. likely	<u>Number sp. present</u>		<u>Percent of likely sp.</u>	
			2001	2002	2001	2002
Insectivora	7	2	0	1	0	50
Chiroptera	16	13	8	9	62	69
Lagomorpha	6	4	3	3	75	75
Rodentia	24	21	18	21	86	100
Carnivora	17	11	5	8	45	73
Artiodactyla	5	4	4	4	100	100
Total	75	55	38	46	69%	84%

Table 12f. Level of documentation for major groups of mammals on GOSP and overall level of documentation for all mammals.

Order	Number sp. possible	Number sp. likely	<u>Number sp. present</u>		<u>Percent of likely sp.</u>	
			2001	2002	2001	2002
Insectivora	7	5	0	0	0	0
Chiroptera	15	7	4	4	57	57
Lagomorpha	6	5	1	3	20	60
Rodentia	30	14	9	12	64	86
Carnivora	17	10	3	8	30	80
Artiodactyla	5	2	1	2	50	100
Total	80	43	18	29	42%	67%

Table 12g. Level of documentation for major groups of mammals on HOVE and overall level of documentation for all mammals.

Order	Number sp. possible	Number sp. likely	<u>Number sp. present</u>		<u>Percent of likely sp.</u>	
			2001	2002	2001	2002
Insectivora	4	4	0	1	0	25
Chiroptera	17	11	6	6	55	55
Lagomorpha	4	3	2	2	67	67
Rodentia	25	19	12	17	60	89
Carnivora	17	13	4	10	31	77
Artiodactyla	4	2	0	1	0	50
Total	71	52	24	37	45%	71%

Table 12h. Level of documentation for major groups of mammals on PISP and overall level of documentation for all mammals.

Order	Number sp. possible	Number sp. likely	<u>Number sp. present</u>		<u>Percent of likely sp.</u>	
			2001	2002	2001	2002
Insectivora	5	3	0	0	0	0
Chiroptera	20	15	10	12	77	80
Lagomorpha	3	2	1	1	50	50
Rodentia	23	18	13	16	76	89
Carnivora	15	9	0	4	0	44
Artiodactyla	4	1	0	0	0	0
Total	70	48	24	33	53%	68%

Table 12i. Level of documentation for major groups of mammals on TICA and overall level of documentation for all mammals.

Order	Number sp. possible	Number sp. likely	<u>Number sp. present</u>		<u>Percent of likely sp.</u>	
			2001	2002	2001	2002
Insectivora	7	6	0	1	0	17
Chiroptera	16	13	6	8	46	62
Lagomorpha	6	3	0	2	0	67
Rodentia	28	19	7	17	37	89
Carnivora	17	13	2	11	14	85
Artiodactyla	5	4	2	4	50	100
Total	79	58	17	43	29%	74%

Table 13. Locations sampled on BLCA during 2002 mammal inventory.

Location ID	Waypoint name	UTM (NAD27)		Date of visit	Sampling method	Number of species (animals)	Observer(s)
		Easting	Northing				
LHC EPC	BL01B	267188	4268053	07/07/02	track-scat survey	1	L.Harding
LHC EPC	BL02B	267238	4268134	07/07/02	track-scat survey	1	L.Harding
LHC SRR	BL03B	264431	4271043	07/07/02	track-scat survey	1	L.Harding
LHC WPT	BL04B	260906	4271633	07/08/02	track-scat survey	1	L.Harding
LHC WPT	BL05B	260569	4271790	07/08/02	track-scat survey	1	L.Harding
LHC WPT	BL06B	260429	4271921	07/08/02	track-scat survey	1	L.Harding
LHC WPT	BL07B	260373	4271873	07/08/02	track-scat survey	2	L.Harding
LHC Redrockriver	BL08B	257925	4274885	08/05/02	track-scat survey	1	L.Harding
LHC Redrockriver	BL09B	257498	4275097	08/05/02	track-scat survey	1	L.Harding
LHC Redrockriver	BL10B	257457	4275072	08/05/02	track-scat survey	1	L.Harding
LHC Redrockcanyon	BL11B	257069	4274852	08/06/02	track-scat survey	1	L.Harding
LHC Redrockcanyon	BL12B	256924	4274038	08/06/02	track-scat survey	1	L.Harding
LHC Redrockcanyon	BL13B	256942	4273598	08/06/02	track-scat survey	1	L.Harding
LHC Redrockcanyon	BL14B	257021	4273340	08/06/02	track-scat survey	1	L.Harding
LHC Redrockcanyon	BL15B	257116	4273157	08/06/02	track-scat survey	1	L.Harding
LHC Redrockcanyon	BL16B	257196	4272690	08/06/02	track-scat survey	1	L.Harding
LHC Redrockcanyon	BL17B	257181	4272493	08/06/02	track-scat survey	1	L.Harding

Table 13. Continued.

Location ID	Waypoint name	<u>UTM (NAD27)</u>		Date of visit	Sampling method	Number of species (animals)	Observer(s)
		Easting	Northing				
LHC NORIM	BL18B	266672	4271675	08/08/02	track-scat survey	1	L.Harding
LHC NORIM	BL19B	267019	4271214	08/08/02	track-scat survey	1	L.Harding
LHC DHT	BL20B	267097	4271518	08/08/02	track-scat survey	1	L.Harding

Table 14. Locations sampled on CARE during 2002 mammal inventory.

Location ID	Waypoint name	UTM (NAD27)		Date of visit	Sampling method	Number of species (animals)	Observer(s)
		Easting	Northing				
Ackland	CR001A	478813	4255120	07/07/02	mist net, acoustic	7 (43)	S. Haymond, E. Valdez
Ackland	CR002A	478987	4255160	07/07/02	mist net	4 (14)	S. Haymond, E. Valdez
Hickman	CR003A	480112	4237627	07/08/02	mist net, acoustic, opportunistic	12 (28)	S. Haymond, E. Valdez
Canal	CR004A	477290	4236478	07/09/02	mist net, acoustic	10 (29)	S. Haymond, E. Valdez
LHC FRRV	CR01B	478109	4237594	06/03/02	track-scat survey	2	L. Harding
LHC FRRV	CR02B	478095	4237607	06/03/02	track-scat survey	0	L. Harding
LHC UMT	CR03B	493068	4196657	06/04/02	track-scat survey	1	L. Harding
LHC PLCR	CR04B	484524	4225789	06/05/02	track-scat survey	1	L. Harding
LHC PLCR	CR05B	484311	4225700	06/05/02	track-scat survey	1	L. Harding
LHC PLCR	CR06B	484195	4225524	06/05/02	track-scat survey	1	L. Harding
LHC FRE	CR07B	488794	4237234	07/20/02	track-scat survey	1	L.Harding, C.Viana
LHC FRE	CR08B	488778	4237229	07/20/02	track-scat survey	1	L.Harding, C.Viana
LHC FRE	CR09B	488624	4237178	07/20/02	track-scat survey	1	L.Harding, C.Viana
LHC FRE	CR10B	488589	4237161	07/20/02	track-scat survey	1	L.Harding, C.Viana
LHC FRE	CR11B	488523	4237132	07/20/02	track-scat survey	1	L.Harding, C.Viana
LHC LSDOR	CR12B	483407	4250235	07/20/02	track-scat survey	1	L.Harding, C.Viana
LHC CATSP	CR13B	479055	4254879	07/20/02	track-scat survey	1	L.Harding, C.Viana

Table 14. Continued.

Location ID	Waypoint name	<u>UTM (NAD27)</u>		Date of visit	Sampling method	Number of species (animals)	Observer(s)
		Easting	Northing				
LHC CATSP	CR14B	473924	4257063	07/20/02	track-scat survey	1	L.Harding, C.Viana
LHC NOBF	CR15B	494433	4209338	07/21/02	track-scat survey	1	L.Harding, C.Viana
LHC BCR	CR16B	497255	4194067	07/21/02	track-scat survey	3	L.Harding, C.Viana
LHC FRUITA	CR17B	478528	4236982	07/21/02	track-scat survey	1 (1)	L.Harding, C.Viana
LHC FRUITA	CR18B	478142	4237019	07/21/02	track-scat survey	1	L.Harding, C.Viana
LHC HWY24E	CR19B	478422	4237538	07/21/02	track-scat survey	2	L.Harding, C.Viana

Table 15. Locations sampled on CEBR during 2002 mammal inventory.

Location ID	Waypoint name	UTM (NAD27)		Date of visit	Sampling method	No. of species (animals)	Observer(s)
		Easting	Northing				
Junction	CE001A	338766	4168758	07/03/02	mist net, acoustic, opportunistic	7 (5)	S. Haymond, E. Valdez
AlpinePond	CE002A	339069	4166810	07/04/02	mist net, acoustic survey	7 (13)	S. Haymond, E. Valdez
Ashdown	CE003A	335111	4166828	07/05/02	acoustic survey	4	S. Haymond, E. Valdez
Ashdown	CE004A	335209	4166742	07/05/02	mist net	0	S. Haymond, E. Valdez
Ashdown	CE005A	335239	4166835	07/05/02	mist net	1 (2)	S. Haymond, E. Valdez
CEBRCAMP	CE006A	338483	4163998	07/06/02	acoustic survey	2	S. Haymond, E. Valdez
LHC ASH	CE01B	335469	4166932	06/06/02	track-scat survey	1	L. Harding
LHC ASH	CE02B	335129	4166827	06/06/02	track-scat survey	1	L. Harding
LHC ALP	CE03B	339096	4166862	06/07/02	track-scat survey	1	L. Harding
LHC ALP	CE04B	339165	4166991	06/07/02	track-scat survey	1	L. Harding
LHC ALP	CE05B	339175	4167046	06/07/02	track-scat survey	1	L. Harding
LHC ALP	CE06B	339155	4167126	06/07/02	track-scat survey	0	L. Harding
LHC CMT	CE07B	338438	4166518	06/08/02	track-scat survey	1	L. Harding
LHC CMT	CE08B	339057	4166745	06/08/02	track-scat survey	1 (1)	L. Harding
LHC CMM	CE09B	339155	4165936	06/08/02	track-scat survey	1	L. Harding
LHC SUN	CE10B	338700	4165088	06/08/02	track-scat survey	1	L. Harding
LHC SOM	CE11B	339253	4165233	06/09/02	track-scat survey	1	L. Harding

Table 15. Continued.

Location ID	Waypoint name	UTM (NAD27)		Date of visit	Sampling method	No. of species (animals)	Observer(s)
		Easting	Northing				
LHC PUMP	CE12B	336825	4163761	06/09/02	track-scat survey	1	L. Harding
LHC AMDW	CE13B	335626	4166494	07/23/02	track-scat survey	1	L.Harding, C.Viana
LHC AMDW	CE14B	335617	4166748	07/23/02	track-scat survey	1 (1)	L.Harding, C.Viana
LHC AMDW	CE15B	334191	4166882	07/23/02	track-scat survey	1	L.Harding, C.Viana
LHC CMM	CE16B	339029	4165950	06/08/02	track-scat survey	0	L. Harding
CEZAP	CEZAP	338802	4165098	06/30/02	trapline	1 (1)	C. Ramotnik
RCE01	RCE01A	338687	4165061	06/29/02	trapline	1 (3)	M. Bogan
RCE01	RCE01B	338644	4164949	06/29/02			M. Bogan
RCE02	RCE02A	338777	4165055	06/29/02	trapline	3 (7)	C. Ramotnik
RCE02	RCE02B	338841	4165114	06/29/02			C. Ramotnik
RCE03	RCE03A	338724	4166031	06/30/02	trapline	1 (2)	M. Bogan
RCE03	RCE03B	338971	4166097	06/30/02			M. Bogan
REC04	RCE04A	338906	4166770	07/01/02	trapline	0	M. Bogan
RCE04	RCE04B	339050	4166791	07/01/02			M. Bogan
RCE05	RCE05A	337850	4163816	07/02/02	trapline	2 (10)	M. Bogan
RCE05	RCE05B	337913	4163836	07/02/02			M. Bogan
RCE06	RCE06	338035	4164028	07/02/02	trapline	3 (10)	M. Bogan
RCE07	RCE07	337116	4163603	07/03/02	trapline	3 (12)	M. Bogan
RCE08	RCE08	337696	4163753	07/03/02	trapline	2 (9)	M. Bogan

Table 15. Continued.

Location ID	Waypoint name	<u>UTM (NAD27)</u>		Date of visit	Sampling method	No. of species (animals)	Observer(s)
		Easting	Northing				
LHC CCC	RCETC1A	337559	4163630	07/22/02	trapline	1 (1)	L. Harding
LHC CCC	RCETC1B	337562	4163574	07/23/02			L. Harding
LHC CCC	RCETR1A	337865	4163808	07/23/02	trapline	3 (10)	L. Harding
LHC CCC	RCETR1B	337906	4163806	07/23/02			L. Harding

Table 16. Locations sampled on CURE during 2002 mammal inventory.

Location ID	Waypoint name	UTM (NAD27)		Date of visit	Sampling method	Number of species (animals)	Observer(s)
		Easting	Northing				
CUG8VW	CU001A	304019	4250867	08/11/02	mist net	0	E. Valdez, E. Cofell
CUG8VW	CU002A	304035	4250801	08/11/02	mist net, acoustic	6 (4)	E. Valdez, E. Cofell
LHC GUT	CU01B	269678	4266816	07/07/02	track-scat survey	1	L.Harding
LHC GUR	CU02B	320955	4261708	07/08/02	track-scat survey	1	L.Harding
LHC GUR	CU03B	320859	4261656	07/08/02	track-scat survey	2	L.Harding
LHC GUR	CU04B	320982	4261591	07/08/02	track-scat survey	1	L.Harding
LHC DRY	CU05B	313041	4259997	07/09/02	track-scat survey	1	L.Harding
LHC DRY	CU06B	313018	4260170	07/09/02	track-scat survey	1	L.Harding
LHC NVS	CU07B	324650	4264768	07/10/02	track-scat survey	1	L.Harding
LHC NVS	CU08B	324512	4264747	07/10/02	track-scat survey	1	L.Harding
LHC GVR	CU09B	303912	4251030	07/10/02	track-scat survey	1	L.Harding
LHC GVR	CU10B	304218	4250618	07/10/02	track-scat survey	1	L.Harding
LHC LAKE	CU11B	303604	4252944	08/07/02	track-scat survey	2	L.Harding, C.Viana, M.Chase
LHC LAKE	CU12B	303625	4252858	08/07/02	track-scat survey	1	L.Harding, C.Viana, M.Chase
LHC LAKE	CU13B	303651	4252782	08/07/02	track-scat survey	1	L.Harding, C.Viana, M.Chase
LHC LAKE	CU14B	303657	4252972	08/07/02	track-scat survey	1	L.Harding, C.Viana, M.Chase
LHC LAKE	CU15B	303487	4253116	08/07/02	track-scat survey	1	L.Harding, C.Viana, M.Chase

Table 16. Continued.

Location ID	Waypoint name	<u>UTM (NAD27)</u>		Date of visit	Sampling method	Number of species (animals)	Observer(s)
		Easting	Northing				
LHC WEC	CU16B	301525	4263551	08/07/02	track-scat survey	1	L.Harding, C.Viana, M.Chase
LHC WEC	CU17B	301573	4263628	08/07/02	track-scat survey	2	L.Harding, C.Viana, M.Chase
LHC WEC	CU18B	301757	4264408	08/07/02	track-scat survey	1	L.Harding, C.Viana, M.Chase
LHC WEC	CU19B	301792	4264385	08/07/02	track-scat survey	1	L.Harding, C.Viana, M.Chase
RCU98	RCU98A	277149	4257716	08/29/02	trapline	3 (9)	M. Bogan
RCU98	RCU98B	277060	4257834	08/29/02			M. Bogan
RCU99	RCU99A	278061	4259028	08/29/02	trapline	2 (15)	M. Bogan
RCU99	RCU99B	277930	4259194	08/29/02			M. Bogan

Table 17. Locations sampled on FOBU during 2002 mammal inventory.

Location ID	Waypoint name	UTM (NAD27)		Date of visit	Sampling method	Number of species (animals)	Observer(s)
		Easting	Northing				
Millet	FO001A	517997	4636117	06/23/02	mist net	5 (6)	S. Haymond, E. Valdez
Millet	FO001A	517997	4636117	08/07/02	mist net, acoustic		E. Valdez, E. Cofell
Moose	FO002A	520161	4634708	06/24/02	mist net, acoustic	7 (34)	S. Haymond, E. Valdez
Moose	FO002A	520161	4634708	08/08/02	mist net, acoustic		E. Valdez, E. Cofell
FossilLake	FO003A	518598	4635389	06/25/02	acoustic survey	3	S. Haymond, E. Valdez
FossilLake	FO003A	518598	4635389	08/09/02	mist net, acoustic		E. Valdez, E. Cofell
FossilLake	FO004A	518525	4635273	06/25/02	mist net	2 (2)	S. Haymond, E. Valdez
	FO005A	518688	4636414	06/24/02	opportunistic	1	S. Haymond, E. Valdez
FOBU VC	FO007A	519135	4631273	06/24/02	opportunistic	1 (1)	S. Haymond, E. Valdez
LHC MILLET	FO01B	517833	4635718	06/18/02	track-scat survey	2	L. Harding, C. Viana
LHC MILLET	FO02B	517845	4635854	06/18/02	track-scat survey	1	L. Harding, C. Viana
LHC MILLET	FO03B	517779	4635787	06/18/02	track-scat survey	1	L. Harding, C. Viana
LHC MILLET	FO04B	517747	4635621	06/18/02	track-scat survey	1	L. Harding, C. Viana
LHC FBVC	FO05B	519887	4630098	06/19/02	track-scat survey	1	L. Harding, C. Viana
LHC CRP	FO06B	519635	4634588	08/01/02	track-scat survey	1	L. Harding, C. Viana
LHC CRP	FO07B	520089	4634585	08/01/02	track-scat survey	1	L. Harding, C. Viana
LHC CRP	FO08B	520201	4634721	08/01/02	track-scat survey	1	L. Harding, C. Viana
LHC FLT	FO09B	518653	4634857	08/02/02	track-scat survey	1	L. Harding, C. Viana

Table 17. Continued.

Location ID	Waypoint name	UTM (NAD27)		Date of visit	Sampling method	Number of species (animals)	Observer(s)
		Easting	Northing				
RFO01	RFO01A	518094	4634203	07/16/02			M. Bogan
RFO01	RFO01A	518094	4634203	07/17/02			M. Bogan
RFO01	RFO01B	518254	4634116	07/16/02	trapline	6 (21)	M. Bogan
RFO01	RFO01B	518254	4634116	07/17/02			M. Bogan
RFO02	RFO02A	518532	4632707	07/16/02			M. Bogan
RFO02	RFO02B	518582	4632911	07/16/02	trapline	1 (1)	M. Bogan
RFO03	RFO03A	522033	4630005	07/17/02			M. Bogan
RFO03	RFO03B	521778	4630006	07/17/02	trapline	3 (8)	M. Bogan
RFO04	RFO04	519059	4631431	07/17/02	trapline	2 (20)	M. Bogan
RFO05	RFO05A	518446	4635093	07/19/02			M. Bogan
RFO05	RFO05B	518548	4635263	07/19/02	trapline	5 (15)	M. Bogan
RFO06	RFO06A	517991	4635757	07/19/02			M. Bogan
RFO06	RFO06B	517981	4635779	07/19/02	trapline	2 (19)	M. Bogan
RFO07	RFO07A	518797	4636399	07/19/02			M. Bogan
RFO07	RFO07B	518871	4636398	07/19/02	trapline	3 (5)	M. Bogan

Table 18. Locations sampled on GOSP during 2002 mammal inventory.

Location ID	Waypoint name	UTM (NAD27)		Date of visit	Sampling method	Number of species (animals)	Observer(s)
		Easting	Northing				
Blue Creek	GO001A	379476	4614162	06/20/02	mist net, acoustic	2	S. Haymond, E. Valdez
Canyon	GO002A	374648	4609007	06/21/02	acoustic survey	3	S. Haymond, E. Valdez
Canyon	GO003A	374709	4608998	06/21/02	mist net	1 (1)	S. Haymond, E. Valdez
Residence	GO004A	371411	4608328	06/22/02	mist net, acoustic	1	S. Haymond, E. Valdez
GOSP VC	GO007A	370879	4608452	06/20/02	opportunistic	1 (1)	E. Valdez
LHC EAST	GO01B	375968	4609493	06/20/02	track-scat survey	1	L. Harding, C. Viana
LHC EAST	GO02B	374678	4609068	06/20/02	track-scat survey	1	L. Harding, C. Viana
LHC EAST	GO03B	374754	4609018	06/20/02	track-scat survey	0	L. Harding, C. Viana
LHC EAST	GO04B	374871	4608623	06/20/02	track-scat survey	1	L. Harding, C. Viana
LHC EAST	GO05B	374881	4608631	06/20/02	track-scat survey	1	L. Harding, C. Viana
LHC EROCK	GO06B	376068	4610743	06/21/02	track-scat survey	1	L. Harding, C. Viana
LHC EROCK	GO07B	376171	4610779	06/21/02	track-scat survey	0	L. Harding, C. Viana
LHC BLUE	GO08B	379512	4614189	06/21/02	track-scat survey	2	L. Harding, C. Viana
GOBLU1	GOBLU1	379478	4614157	07/22/02	trapline	2 (2)	M. Bogan
GOBLU2	GOBLU2	379584	4614162	07/22/02	trapline	1 (13)	M. Bogan
GOLECA	GOLECA	375569	4610269	07/21/02	opportunistic	1 (1)	M. Bogan
GORICK	GORICK	371377	4608337	07/23/02	trapline	2 (5)	M. Bogan

Table 18. Continued.

Location ID	Waypoint name	UTM (NAD27)		Date of visit	Sampling method	Number of species (animals)	Observer(s)
		Easting	Northing				
RGO01	RGO01A	364593	4602699	07/20/02	trapline	1 (1)	M. Bogan
RGO02	RGO02A	376188	4610499	07/21/02	trapline	2 (3)	M. Bogan
RGO02	RGO02B	375955	4610491	07/21/02			M. Bogan
RGO03	RGO03A	371055	4608763	07/21/02	trapline	1 (2)	M. Bogan
RGO03	RGO03B	370912	4608644	07/21/02			M. Bogan
RGO04	RGO04A	371474	4608056	07/22/02	trapline	3 (3)	M. Bogan
RGO04	RGO04B	371167	4608091	07/22/02			M. Bogan
RGO05	RGO05A	370760	4608278	07/23/02	trapline	3 (7)	M. Bogan
RGO05	RGO05B	370903	4608396	07/23/02			M. Bogan

Table 19. Locations sampled on HOVE during 2002 mammal inventory.

Location ID	Waypoint name	UTM (NAD27)		Date of visit	Sampling method	Number of species (animals)	Observer(s)
		Easting	Northing				
Goodman Pt	HO001A	701423	4142584	06/06/02	acoustic survey	3	S. Haymond, E. Valdez
Goodman Pt	HO002A	701361	4142430	06/06/02	opportunistic	3	S. Haymond, E. Valdez
Square Twr	HO003A	669947	4139219	06/07/02	mist net, acoustic, opportunistic	7 (27)	S. Haymond, E. Valdez E. Valdez
Square Twr	HO003A	669947	4139219	07/21/02			
Hackberry	HO004A	674867	4141741	06/08/02	mist net, acoustic survey	6 (78)	S. Haymond, E. Valdez E. Valdez
Hackberry	HO004A	674867	4141741	07/20/02	mist net, acoustic survey		
Cajon	HO005A	661017	4129409	06/09/02	acoustic survey	2	S. Haymond, E. Valdez
LHC STC	HO01B	670670	4138861	07/04/02	track-scat survey	1	L.Harding
LHC STC	HO02B	670538	4138829	07/04/02	track-scat survey	1	L.Harding
LHC STC	HO03B	670404	4138813	07/04/02	track-scat survey	1	L.Harding
LHC STC	HO04B	670142	4138906	07/04/02	track-scat survey	1	L.Harding
LHC STC	HO05B	669928	4138790	07/04/02	track-scat survey	2	L.Harding
LHC STC	HO06B	669942	4139227	07/04/02	track-scat survey	3	L.Harding
LHC CAJ	HO07B	660840	4129401	07/05/02	track-scat survey	1	L. Harding
LHC CAJ	HO08B	660854	4129526	07/05/02	track-scat survey	1	L. Harding
LHC CAJ	HO09B	660837	4129629	07/05/02	track-scat survey	1	L. Harding
LHC HHS	HO10B	674436	4141844	07/05/02	track-scat survey	1	L. Harding
LHC HHS	HO11B	674686	4141818	07/05/02	track-scat survey	1	L. Harding

Table 19. Continued.

Location ID	Waypoint name	UTM (NAD27)		Date of visit	Sampling method	Number of species (animals)	Observer(s)
		Easting	Northing				
LHC HHS	HO12B	674763	4141584	07/05/02	track-scat survey	1	L. Harding
LHC HOLLY	HO13B	673303	4140771	07/05/02	track-scat survey	1	L. Harding
LHC CTC	HO14B	678615	4145707	07/06/02	track-scat survey	1	L.Harding
LHC CTC	HO15B	678426	4145818	07/06/02	track-scat survey	1	L.Harding
LHC CTC	HO16B	678383	4145822	07/06/02	track-scat survey	1	L.Harding
RHO01	RHO01	670518	4139549	08/05/02	trapline	3 (5)	M. Bogan
Goodman Pt	RHO01A	701371	4142597	06/06/02	trapline	1 (1)	S. Haymond, E. Valdez
Goodman Pt	RHO01B	701335	4142300	06/06/02			S. Haymond, E. Valdez
RHO02	RHO02A	670936	4139011	08/05/02	trapline	4 (9)	M. Bogan
RHO02	RHO02B	670983	4139178	08/05/02			M. Bogan
RHO03	RHO03B	670949	4139267	08/05/02	trapline	4 (7)	M. Bogan
RHO04	RHO04A	661044	4129356	08/06/02	trapline	1 (1)	M. Bogan
RHO04	RHO04B	661206	4129376	08/06/02			M. Bogan
RHO05	RHO05	661029	4129408	08/06/02	trapline	2 (5)	M. Bogan
RHO06	RHO06A	661210	4129344	08/07/02	trapline	1 (1)	M. Bogan
RHO06	RHO06B	661206	4129682	08/07/02			M. Bogan
RHO07	RHO07A	661194	4129498	08/07/02	trapline	1 (1)	M. Bogan
RHO07	RHO07B	661192	4129735	08/07/02			M. Bogan
RHO08	RHO08A	701408	4142614	08/08/02	trapline	2 (3)	M. Bogan

Table 19. Continued.

Location ID	Waypoint name	<u>UTM (NAD27)</u>		Date of visit	Sampling method	Number of species (animals)	Observer(s)
		Easting	Northing				
RHO08	RHO08B	701545	4142629	08/08/02			M. Bogan
RHO09	RHO09	701436	4142570	08/08/02	trapline	2 (7)	M. Bogan
RHO10	RHO10A	701369	4142517	08/09/02	trapline	2 (2)	M. Bogan
RHO10	RHO10B	701511	4142424	08/09/02			M. Bogan

Table 20. Locations sampled on PISP during 2002 mammal inventory.

Location ID	Waypoint name	UTM (NAD27)		Date of visit	Sampling method	Number of species (animals)	Observer(s)
		Easting	Northing				
Ponds	PI001A	345013	4080883	07/01/02	mist net, acoustic, opportunistic	10 (18)	S. Haymond, E. Valdez
Ponds	PI001A	345013	4080883	07/22/02	mist net, acoustic, opportunistic		E. Valdez
WSHRUB	PI002A	344872	4080768	07/02/02	pitfalls	0	S. Haymond, E. Valdez
Escarpment	PI003A	344847	4080971	07/02/02	acoustic survey	8	S. Haymond, E. Valdez
LHC LPSP	PI01B	345096	4080818	06/11/02	track-scat survey	1	L. Harding
LHC UPSP	PI02B	344818	4081035	06/11/02	track-scat survey	1	L. Harding
LHC UPSP	PI03B	344878	4080991	06/11/02	track-scat survey	1(1)	L. Harding
LHC UPSP	PI04B	344980	4080951	06/11/02	track-scat survey	1(1)	L. Harding
LHC LPSP	PI05B	345033	4081003	06/11/02	track-scat survey	1	L. Harding
LHC LPSP	PI06B	345017	4080954	06/11/02	track-scat survey	2 (2)	L. Harding
LHC LPSP	PI07B	345154	4081003	06/11/02	track-scat survey	1	L. Harding
LHC LPSP	PI08B	345096	4080930	06/11/02	track-scat survey	1	L. Harding
LHC LPSP	PI09B	344868	4080891	06/11/02	track-scat survey	2 (1)	L. Harding
RPI01	RPI01A	345172	4080855	06/26/02	trapline	3 (4)	M. Bogan
RPI01	RPI01B	345177	4081065	06/26/02			M. Bogan
RPI02	RPI02A	344779	4080674	06/26/02	trapline	7 (19)	M. Bogan
RPI02	RPI02B	344830	4080879	06/26/02			M. Bogan
RPI03	RPI03	345016	4080895	06/28/02	trapline	7 (29)	M. Bogan

Table 20. Continued.

Location ID	Waypoint name	<u>UTM (NAD27)</u>		Date of visit	Sampling method	Number of species (animals)	Observer(s)
		Easting	Northing				
RPI03	RPI03A	345016	4080895	06/27/02	trapline	5 (20)	M. Bogan
RPI03	RPI03B	344806	4081069	06/27/02			M. Bogan
RPI04	RPI04A	344862	4080873	06/27/02	trapline	4 (14)	M. Bogan
RPI04	RPI04B	344856	4080969	06/27/02			M. Bogan

Table 21. Locations sampled on TICA during 2002 mammal inventory.

Location ID	Waypoint name	<u>UTM (NAD27)</u>		Date(s) of visit	Sampling method	Number of species (animals)	Observer(s)
RTI01	RTI01	440005	4477325	07/12/02	trapline		M. Bogan
RTI01	RTI01	440005	4477325	07/13/02	trapline	3 (5)	M. Bogan
RTI02	RTI02	440011	4477247	07/12/02	trapline		M. Bogan
RTI02	RTI02	440011	4477247	07/13/02	trapline	3 (8)	M. Bogan
RTI03	RTI03A	440128	4477059	07/12/02			M. Bogan
RTI03	RTI03B	439928	4477055	07/12/02	trapline	1 (3)	M. Bogan
RTI04	RTI04A	439557	4476883	07/13/02			M. Bogan
RTI04	RTI04A	439557	4476883	07/14/02			M. Bogan
RTI04	RTI04B	439513	4476830	07/13/02	trapline	3 (16)	M. Bogan
RTI04	RTI04B	439513	4476830	07/14/02			M. Bogan
RTI05	RTI05A	439359	4476579	07/14/02			M. Bogan
RTI05	RTI05A	439359	4476579	07/15/02			M. Bogan
RTI05	RTI05B	439614	4476659	07/14/02	trapline	1 (2)	M. Bogan
RTI05	RTI05B	439614	4476659	07/15/02			M. Bogan
RTI06	RTI06	440111	4477080	07/16/02	trapline	2 (2)	M. Bogan
RTI07	RTI07A	440142	4477054	07/16/02			M. Bogan
RTI07	RTI07B	439868	4476954	07/16/02	trapline	1 (4)	M. Bogan
LHC RTS	RTIT1A	440761	4474553	08/02/02			L. Harding
LHC RTS	RTIT1B	440877	4474549	08/02/02	trapline	2 (4)	L. Harding
LHC RTC	RTIT4A	440694	4474600	08/02/02	trapline	2 (7)	L. Harding

Table 21. Continued.

Location ID	Waypoint name	UTM (NAD27)		Date(s) of visit	Sampling method	Number of species (animals)	Observer(s)
		Easting	Northing				
LHC RTC	RTIT4B	440762	4474635	08/02/02			L. Harding
LHC RTC	RTIT7A	440686	4474555	08/02/02			L. Harding
LHC RTC	RTIT7B	440710	4474454	08/02/02	trapline	2 (5)	L. Harding
TICA	TI001A	440213	4477038	06/17/02	acoustic survey	5	S. Haymond, E. Valdez
TICA	TI002A	440276	4477093	06/18/02	mist net, acoustic		S. Haymond, E. Valdez
TICA	TI002A	440276	4477093	08/06/02	mist net, acoustic	5 (2)	E. Valdez, E. Cofell
TICA	TI003A	439563	4476899	06/19/02	mist net	0	S. Haymond, E. Valdez
TICA	TI004A	439365	4476723	06/19/02	acoustic survey	4	S. Haymond, E. Valdez
TICA	TI005A	441884	4477370	07/18/02	acoustic survey	5	S. Haymond
TICA	TI006A	440414	4477080	08/05/02	mist net, acoustic	6 (2)	E. Valdez, E. Cofell
TICAPIPE	TI007A	439892	4477177	08/06/02	roost search	1 (1)	E. Valdez, E. Cofell
TICAPIPE	TI008A	439425	4476998	08/06/02	roost search	1 (1)	E. Valdez, E. Cofell
LHC TCHT	TI01B	439330	4476704	06/22/02	track-scat survey	1	L. Harding, C. Viana
LHC TCHT	TI02B	439545	4476692	06/22/02	track-scat survey	1	L. Harding, C. Viana
LHC TCTR	TI03B	439626	4476462	06/23/02	track-scat survey	1	L. Harding, C. Viana
LHC TCTR	TI04B	439665	4476516	06/23/02	track-scat survey	1	L. Harding, C. Viana
LHC TCTR	TI05B	439891	4476577	06/23/02	track-scat survey	1	L. Harding, C. Viana
LHC TCTOP	TI06B	439410	4474662	06/24/02	track-scat survey	1	L. Harding, C. Viana

Table 21. Continued.

Location ID	Waypoint name	<u>UTM (NAD27)</u>		Date(s) of visit	Sampling method	Number of species (animals)	Observer(s)
		Easting	Northing				
LHC TCTOP	TI07B	439261	4474695	06/24/02	track-scat survey	1	L. Harding, C. Viana
LHC TCTOP	TI08B	439619	4474640	06/24/02	track-scat survey	1	L. Harding, C. Viana
LHC RTS	TI09B	440741	4474578	08/03/02	track-scat survey	2	L. Harding
LHC AFC	TI10B	437625	4476013	08/03/02	track-scat survey	1	L. Harding, C.Viana

Table 22. Field schedule for 2002 mammal inventories, in chronological order, indicating dates, parks visited, observers, effort and sampling methods.

Date(s)	Park visited	Observer(s)	Effort					Sampling method(s)
			Person days	Trap nights	Net nights	Acoustic hours	Carnivore survey distance (km)	
3-5 June	CARE	L. Harding	3				215.4	track-scat survey, spotlighting
6-9 June	HOVE	S. Haymond, E. Valdez	8	40	3	13.3		mist nets, small-mammal traplines, acoustic surveys
	CEBR	L. Harding	4				62.8	track-scat survey
10-11 June	PISP	L. Harding	2				1.6	track-scat survey, spotlighting
17-19 June	TICA	S. Haymond, E. Valdez	6		5	6.3		mist nets, acoustic surveys
	FOBU	L. Harding, C. Viana	4				25.4	track-scat survey, spotlighting
20-22 June	GOSP	L. Harding, S. Haymond, E. Valdez, C. Viana	10		6	7.6	54.1	mist nets, acoustic surveys, track-scat survey, spotlighting

Table 22. Continued.

Date(s)	Park visited	Observer(s)	Effort					Sampling method(s)
			Person days	Trap nights	Net nights	Acoustic hours	Carnivore survey distance (km)	
22-25 June	FOBU	S. Haymond, E. Valdez	6		9	6.2		mist nets, acoustic surveys
	TICA	L. Harding, C. Viana	8				52.9	track-scat survey
26-28 June	PISP	M. Bogan, C. Ramotnik	6	320				small mammal traplines
29 June-6 July	PISP	S. Haymond, E. Valdez	4	4	3	5.3		mist nets, acoustic surveys, pitfalls
	CEBR	M. Bogan, S. Haymond, C. Ramotnik, E. Valdez	18	410	9	13.0		mist nets, acoustic surveys, small mammal traplines
	HOVE	L. Harding	3	9			8.9	track-scat survey, small-carnivore traplines

Table 22. Continued.

Date(s)	Park visited	Observer(s)	Effort					Sampling method(s)
			Person days	Trap nights	Net nights	Acoustic hours	Carnivore survey distance (km)	
7-10 July	CARE	S. Haymond, E. Valdez	6		8	8.0		mist nets, acoustic
	BLCA	L. Harding	2				95.0	track-scat survey
	CURE	L. Harding	3				81.8	track-scat survey
12-15 July	TICA	M. Bogan, T. Mollhagen	8	459				small mammal traplines
16-24 July	FOBU	M. Bogan, T. Mollhagen	8	280				small mammal traplines
	TICA	S. Haymond	1			2.0		acoustic surveys
	CARE	L. Harding, C. Viana	6				240.4	track-scat survey, spotlighting
	HOVE	E. Valdez	2		3	7.7		mist nets, acoustic surveys

Table 22. Continued.

Date(s)	Park visited	Observer(s)	Effort					Sampling method(s)
			Person days	Trap nights	Net nights	Acoustic hours	Carnivore survey distance (km)	
	GOSP	M. Bogan, T. Mollhagen	8	345				small mammal traplines
	PISP	E. Valdez	2		3	3.3		mist nets, acoustic surveys
	CEBR	L. Harding, C. Viana	6	48			37.7	track-scat survey, spotlighting, small-mammal traplines, small carnivore traplines
1-2 August	FOBU	L. Harding, C. Viana	4				26.5	track-scat survey, spotlighting
2-3 August	TICA	L. Harding, C. Viana	4	60			88.1	track-scat survey, small mammal traplines
5-11 August	BLCA	L. Harding, C. Viana	6				26.3	track-scat survey, spotlighting
	CURE	L. Harding, C. Viana	2				68.8	track-scat survey, spotlighting

Table 22. Continued.

Date(s)	Park visited	Observer(s)	Effort				Carnivore survey distance (km)	Sampling method(s)
			Person days	Trap nights	Net nights	Acoustic hours		
	TICA	E. Cofell, E. Valdez	4		6	5.0		mist nets, acoustic surveys
	HOVE	M. Bogan, C. Ramotnik	10	491				small mammal traplines
	FOBU	E. Cofell, E. Valdez	6		8	6.3		mist nets, acoustic surveys
	TICA	M. Bogan, C. Ramotnik	4	40				small mammal traplines, area searches
	CURE	E. Cofell, E. Valdez	2		2	2.3		mist nets, acoustic surveys
29-30 August	CURE	M. Bogan	2	70				small mammal traplines
30-31 August	BLCA	M. Bogan	2					area searches

Table 22. Continued.

Date(s)	Park visited	Observer(s)	Effort					Sampling method(s)
			Person days	Trap nights	Net nights	Acoustic hours	Carnivore survey distance (km)	
18-19 September	HOVE	M. Bogan	2	10				gopher sets
Total			182	2586	65	86.3	1085.7	

Table 23. Mammals observed or captured during 2002.

Species common name	Park code									Total
	BLCA	CARE	CEBR	CURE	FOBU	GOSP	HOVE	PISP	TICA	
Montane shrew					2					2
California myotis		10					32	13		55
Western small-footed myotis		4	5	1	3	3	23	6	5	50
Long-eared myotis			3	2	8		5		8	26
Little brown bat			4	2	33	3		3	7	52
Fringed myotis		1					64	7		72
Long-legged myotis		1	11	3	8					23
Yuma myotis		3			1		4	5	5	18
Silver-haired bat			8		5					13
Western pipistrelle		57				1	15	16		89
Big brown bat		4		1			2	4	5	16
Hoary bat		2	2					1		5
Spotted bat		4	2							6
Townsend's big-eared bat		14						2	2	18
Allen's big-eared bat								4		4
Pallid bat		26					10	26		62
Brazilian free-tailed bat		9		1				1	2	13
Big free-tailed bat		3							1	4
Desert cottontail							1	1		2
Black-tailed jack rabbit						1	1			2
White-tailed jack rabbit					1					1
Yellow pine chipmunk					8					8

Table 23. Continued.

Species common name	Park code									Total
	BLCA	CARE	CEBR	CURE	FOBU	GOSP	HOVE	PISP	TICA	
Cliff chipmunk								1	2	3
Least chipmunk			4		16		3		4	27
Hopi chipmunk				1			3			4
Uinta chipmunk			11							11
Yellow-bellied marmot		1								1
White-tailed antelope squirrel		2						7		9
Wyoming ground squirrel					1					1
Golden-mantled ground squirrel			1						1	2
Rock squirrel							1	2	6	9
Red squirrel			1	1					1	3
Northern pocket gopher			2							2
Silky pocket mouse							4			4
Great Basin pocket mouse						4				4
Long-tailed pocket mouse								10		10
Ord's kangaroo rat						1		5		6
American beaver		1		1						2
Western harvest mouse						3		10	1	14
Brush mouse							5			5
Canyon mouse								9		9
Cactus mouse								2		2
Deer mouse			45	21	35	27	3	16	44	191
Peromyscus sp.								2		2
Pinon mouse			1				22	18		41
Northern grasshopper mouse					2					2
White-throated woodrat				2	1		1		1	5
Desert woodrat								8		8

Table 23. Continued.

Species common name	Park code									Total
	BLCA	CARE	CEBR	CURE	FOBU	GOSP	HOVE	PISP	TICA	
Mexican woodrat							1			1
Long-tailed vole			1		11					12
Montane vole					10					10
Common muskrat		1				1				2
Western jumping mouse			1		4				1	6
Common porcupine	1			1						2
Coyote	5	4	8	7	2	2	12	5	2	47
Red fox		1	3	1	1		1			7
Gray fox	1	3								4
American black bear	3									3
Ringtail	2	3		1			1			7
Common raccoon	3	6		3		1	1			14
American badger		2			1					3
Western spotted skunk							1			1
Striped skunk			1						1	2
Mountain lion	2	1		3	4	2			2	14
Bobcat	4		1	3	2	2	2	1		15
Elk									1	1
Mule deer		1	1	1	1		3			7
Moose									1	1
Bighorn sheep				1						1
Total	21	164	116	57	160	51	221	185	103	1078

Table 24. Mammals observed or captured during 2001 and 2002.

Species common name	Park code									Total
	BLCA	CARE	CEBR	CURE	FOBU	GOSP	HOVE	PISP	TICA	
Masked shrew	1			3						4
Montane shrew			3		2					5
Northern water shrew				2						2
California myotis		31					39	18		88
Western small-footed myotis		7	7	2	6	6	25	11	6	70
Long-eared myotis	10	3	4	4	20		6		8	55
Little brown bat	4		6	14	41	6		3	8	82
Fringed myotis		5					82	16		103
Long-legged myotis	14	16	12	22	14			3	1	82
Yuma myotis	2	13			1		4	8	5	33
Myotis species	1						1			2
Silver-haired bat	1	39	10	7	6					63
Western pipistrelle		93				4	22	38		157
Big brown bat	3	14	1	2	2	2	2	5	6	37
Hoary bat	1	3	2					1		7
Spotted bat	1	8	2							11
Townsend's big-eared bat	1	27			2			2	2	34
Allen's big-eared bat		5						10		15
Pallid bat	4	55					14	62		135
Brazilian free-tailed bat	2	20		1	2			1	3	29
Big free-tailed bat	1	17							2	20

Table 24. Continued.

Species common name	Park code									Total
	BLCA	CARE	CEBR	CURE	FOBU	GOSP	HOVE	PISP	TICA	
Desert cottontail		1					2	1		4
Nuttall's cottontail				1	1	1				3
Sylvilagus species						1				1
Black-tailed jack rabbit		1				1	2			4
White-tailed jack rabbit					2					2
Yellow pine chipmunk					8					8
Cliff chipmunk		1						1	2	4
Least chipmunk	24		22	23	63		7		4	143
Colorado chipmunk				6						6
Hopi chipmunk	3	3		1			6			13
Uinta chipmunk			73						3	76
Yellow-bellied marmot		1	1	2		1				5
White-tailed antelope squirrel		2						7		9
Wyoming ground squirrel					1					1
Golden-mantled ground squirrel	2		2	2					2	8
Rock squirrel				2			2	2	7	13
Gunnison's prairie dog				1						1
Red squirrel			2	3					1	6
Botta's pocket gopher								1		1
Northern pocket gopher	1		6	1	1	1				10
Silky pocket mouse							6			6

Table 24. Continued.

Species common name	Park code									Total
	BLCA	CARE	CEBR	CURE	FOBU	GOSP	HOVE	PISP	TICA	
Great Basin pocket mouse		37			3	21				61
Long-tailed pocket mouse								18		18
Ord's kangaroo rat		1				4		5		10
Beaver		1		2	1					4
Western harvest mouse						9	6	16	2	33
Brush mouse	34	7		5			55			101
Canyon mouse	3	14	16				12	22		67
Cactus mouse								2		2
Deer mouse	179	22	158	227	145	91	17	38	78	955
Pinon mouse	19	59	1				133	32		244
Peromyscus species	1	5						16		22
Northern grasshopper mouse		4			3					7
White-throated woodrat							2			2
Bushy-tailed woodrat	19		2	18	3	1	1		5	49
Desert woodrat		3						20		23
Mexican woodrat							29			29
Long-tailed vole			11	14	14	1				40
Montane vole	1		13	20	15	2				51
Meadow vole				16	1					17
Microtus species				1						1
Muskrat		1				1				2
Western jumping mouse			1	23	11				1	36
Porcupine	1		1	1	1					4

Table 24. Continued.

Species common name	Park code									Total
	BLCA	CARE	CEBR	CURE	FOBU	GOSP	HOVE	PISP	TICA	
Coyote	5	5	8	7	3	3	13	5	2	51
Red fox		1	3	1	1		2			8
Gray fox	1	4								5
American black bear	3	1								4
Ringtail	2	4		1			1		1	9
Raccoon	3	7		3		1	1			15
Ermine			1		1					2
Long-tailed weasel						1				1
Mink									1	1
Badger		2	1		1	1				5
Western spotted skunk							1			1
Striped skunk			1						1	2
Mountain lion	2	2	1	3	4	2	1		2	17
Bobcat	4	1	2	4	2	2	3	1		19
Elk		1	1	1					1	4
Mule deer		2	2	4	2	1	3		1	13
Moose					1				1	2
Bighorn sheep		1		2						3
Pronghorn					1					1
Mountain goat									1	1

Table 24. Continued.

Species common name	Park code									Total
	BLCA	CARE	CEBR	CURE	FOBU	GOSP	HOVE	PISP	TICA	
Total	353	550	377	404	385	164	500	366	157	3303

Table 25. Percent relative abundance for all mammals observed or captured during 2001 and 2002 inventories.

Species common name	Park Code									Total
	BLCA	CARE	CEBR	CURE	FOBU	GOSP	HOVE	PISP	TICA	
Masked shrew	0.3			0.7	0.0					0.1
Montane shrew			0.8		0.5					0.2
Northern water shrew				0.4						0.1
California myotis		5.6					7.8	4.9		2.7
Western small-footed myotis		1.3	1.9	0.4	1.6	3.7	5.0	3.0	3.8	2.1
Long-eared myotis	2.8	0.5	1.1	0.9	5.2		1.2		5.1	1.7
Little brown bat	1.1		1.6	3.1	10.6	3.7		0.8	5.1	2.5
Fringed myotis		0.9					16.4	4.4		3.1
Long-legged myotis	4.0	2.9	3.2	4.9	3.6			0.8	0.6	2.5
Yuma myotis	0.6	2.4			0.3		0.8	2.2	3.2	1.0
Myotis sp.	0.3						0.2			0.1
Silver-haired bat	0.3	7.1	2.6	1.6	1.6					1.9
Western pipistrelle		16.9				2.4	4.4	10.4		4.8
Big brown bat	0.8	2.5	0.3	0.4	0.5	1.2	0.4	1.4	3.8	1.1
Hoary bat	0.3	0.5	0.8					0.3		0.2
Spotted bat	0.3	1.5	0.5							0.3
Townsend's big-eared bat	0.3	4.9			0.5			0.5	1.3	1.0
Allen's big-eared bat		0.9						2.7		0.5
Pallid bat	1.1	10.0					2.8	17.0		4.1
Brazilian free-tailed bat	0.6	3.6		0.2	0.5			0.3	1.9	0.9
Big free-tailed bat	0.3	3.1							1.3	0.6

Table 25. Continued.

Species common name	Park Code									Total
	BLCA	CARE	CEBR	CURE	FOBU	GOSP	HOVE	PISP	TICA	
Desert cottontail		0.2					0.4	0.3		0.1
Nuttall's cottontail				0.2	0.3	0.6				0.1
Sylvilagus sp.						0.6				0.0
Black-tailed jack rabbit		0.2				0.6	0.4			0.1
White-tailed jack rabbit					0.5					0.1
Yellow pine chipmunk					2.1					0.2
Cliff chipmunk		0.2						0.3	1.3	0.1
Least chipmunk	6.8		5.8	5.1	16.4		1.4		2.5	4.3
Colorado chipmunk				1.3						0.2
Hopi chipmunk	0.8	0.5		0.2			1.2			0.4
Uinta chipmunk			19.3						1.9	2.3
Yellow-bellied marmot		0.2	0.3	0.4		0.6				0.2
White-tailed antelope squirrel		0.4						1.9		0.3
Wyoming ground squirrel					0.3					0.0
Golden-mantled ground squirrel	0.6		0.5	0.4					1.3	0.2
Rock squirrel				0.4			0.4	0.5	4.5	0.4
Gunnison's prairie dog				0.2						0.0
Red squirrel			0.5	0.7					0.6	0.2
Botta's pocket gopher								0.3		0.0
Northern pocket gopher	0.3		1.9	0.2	0.3	0.6				0.3
Silky pocket mouse							1.2			0.2

Table 25. Continued.

Species common name	Park Code									Total
	BLCA	CARE	CEBR	CURE	FOBU	GOSP	HOVE	PISP	TICA	
Great Basin pocket mouse		6.7			0.8	12.8				1.8
Long-tailed pocket mouse								4.9		0.5
Ord's kangaroo rat		0.2				2.4		1.4		0.3
Beaver		0.2		0.4	0.3					0.1
Western harvest mouse						5.5	1.2	4.4	1.3	1.0
Brush mouse	9.6	1.3		1.1			11.0			3.1
Canyon mouse	0.8	2.5	4.2				2.4	6.0		2.0
Cactus mouse								0.5		0.1
Deer mouse	50.7	4.0	41.8	50.4	37.7	55.5	3.4	10.4	49.7	28.9
Pinon mouse	5.4	10.7	0.3				26.6	8.8		7.4
Peromyscus sp.	0.3	0.9						4.4		0.7
Northern grasshopper mouse		0.7			0.8					0.2
White-throated woodrat							0.4			0.1
Bushy-tailed woodrat	5.4		0.5	4.0	0.8	0.6	0.2		3.2	1.5
Desert woodrat		0.5						5.5		0.7
Mexican woodrat							5.8			0.9
Long-tailed vole			2.9	3.1	3.6	0.6				1.2
Montane vole	0.3		3.4	4.4	3.9	1.2				1.5
Meadow vole				3.6	0.3					0.5
Microtus sp.				0.2						0.0
Muskrat		0.2				0.6				0.1
Western jumping mouse			0.3	5.1	2.9				0.6	1.1
Porcupine	0.3		0.3	0.2	0.3					0.1

Table 25. Continued.

Species common name	Park Code									Total
	BLCA	CARE	CEBR	CURE	FOBU	GOSP	HOVE	PISP	TICA	
Coyote	1.4	0.9	2.1	1.6	0.8	1.8	2.6	1.4	1.3	1.5
Red fox		0.2	0.8	0.2	0.3		0.4			0.2
Gray fox	0.3	0.7								0.2
American black bear	0.8	0.2								0.1
Ringtail	0.6	0.7		0.2			0.2		0.6	0.3
Raccoon	0.8	1.3		0.7		0.6	0.2			0.5
Ermine			0.3		0.3					0.1
Long-tailed weasel						0.6				0.0
Mink									0.6	0.0
Badger		0.4	0.3		0.3	0.6				0.2
Western spotted skunk							0.2			0.0
Striped skunk			0.3						0.6	0.1
Mountain lion	0.6	0.4	0.3	0.7	1.0	1.2	0.2		1.3	0.5
Bobcat	1.1	0.2	0.5	0.9	0.5	1.2	0.6	0.3		0.6
Elk		0.2	0.3	0.2					0.6	0.1
Mule deer		0.4	0.5	0.4	0.5	0.6	0.6		0.6	0.4
Moose					0.3				0.6	0.1
Bighorn sheep		0.2		0.4						0.1
Pronghorn					0.3					0.0
Mountain goat									0.6	0.0

Table 26. Current working list of mammals from BLCA. Entries in bold indicate changes made in 2002.

Common Name	Park Status	Data Source
Masked shrew	Present	USGS voucher, 2001
Merriam's shrew	Unconfirmed	
montane shrew	Probably Present	
dwarf shrew	Probably Present	
Northern water shrew	Probably Present	
Preble's shrew	Present	Long and Hoffmann, 1992
California myotis	Probably present	fragmentary USGS acoustic files, 2001
Western small-footed bat	Present	Armstrong, 1972
long-eared myotis	Present	Armstrong, 1972; USGS voucher, 2001
little brown bat	Present	Armstrong, 1972
fringed myotis	Present	Armstrong, 1972
long-legged myotis	Present	Armstrong, 1972; USGS voucher, 2001
Yuma myotis	Present	USGS voucher, 2001
silver-haired bat	Present	USGS capture, 2001
hoary bat	Present	Armstrong, 1972; USGS voucher, 2001
Western pipistrelle	Present	Armstrong, 1972
big brown bat	Present	Armstrong, 1972; USGS capture, 2001
spotted bat	Present	Vocalization, USGS, 2001
Townsend's big-eared bat	Present	USGS voucher, 2001
pallid bat	Present	USGS capture, 2001
Brazilian free-tailed bat	Probably present	fragmentary USGS acoustic files, 2001
big free-tailed bat	Present	Vocalization, USGS, 2001
desert cottontail	Unconfirmed	
Nuttall's cottontail	Present	USGS observation, 2001
snowshoe hare	Probably Present	
white-tailed jack rabbit	Probably Present	Armstrong, 1972; NPS possible obs., '82, '83
least chipmunk	Present	Armstrong, 1972; USGS voucher, 2001
Hopi chipmunk	Present	USGS voucher, 2001
yellow-bellied marmot	Present	USGS observation, 2001
golden-mantled ground squirrel	Present	Armstrong, 1972; USGS voucher, 2001
rock squirrel	Present	USGS observation, 2001
Gunnison's prairie dog	Unconfirmed	
white-tailed prairie dog	Unconfirmed	
red squirrel	Present	NPS obs., '88, N rim, Gunnison Pt. overlook
northern pocket gopher	Present	Armstrong, 1972; USGS voucher, 2001
beaver	Present	NPS observation, 1999 in canyon

Table 26. Continued.

Common Name	Park Status	Data Source
western harvest mouse	Probably Present	
brush mouse	Present	Armstrong, 1972; USGS voucher, 2001
canyon mouse	Present	Armstrong, 1972; USGS voucher, 2001
deer mouse	Present	Armstrong, 1972; USGS voucher, 2001
piñon mouse	Present	Armstrong, 1972; USGS voucher, 2001
bushy-tailed woodrat	Present	Armstrong, 1972; USGS voucher, 2001
house mouse	Unconfirmed	
southern red-backed vole	Unconfirmed	
long-tailed vole	Present	Armstrong, 1972
montane vole	Present	USGS voucher, 2001
muskrat	Unconfirmed	
western jumping mouse	Probably Present	
porcupine	Present	USGS observation, 2002
coyote	Present	USGS observation, 2001
gray wolf	Unconfirmed	Likely occurred historically
red fox	Present	NPS observation, 1983, 1990
gray fox	Present	USGS observation, 2002
American black bear	Present	NPS Staff report; scat, 2001
grizzly bear	Unconfirmed	Likely occurred historically
Ringtail	Present	USGS observation, 2002
Raccoon	Present	NPS Staff report
long-tailed weasel	Present	NPS observation, 1984, 1988, 2002
black-footed ferret	Unconfirmed	
mink	Present	NPS obs., '85 on Gunnison Pt., '01 on Warner Pt.
badger	Present	NPS observation
river otter	Present	NPS obs., 1977-1988, 1991 reintroduced
western spotted skunk	Probably Present	NPS possible observation, 1974
striped skunk	Present	NPS observation, 1988
mountain lion	Present	USGS interview (reliable local report)
bobcat	Present	USGS observation, 2001 (mounted skin)
wapiti	Present	USGS observation, 2001
mule deer	Present	USGS observation, 2001
bison	Unconfirmed	
bighorn sheep	Present	NPS obs., 2001, 2002, Warner Rt., Mt. Chase
Pronghorn	Unconfirmed	NPS possible obs., 1988 N rim, N of Y

Unconfirmed = unlikely to occur but retained for present; Probably Present = species likely to occur as range is near or includes park; Present = documented in some fashion.

Table 27. Current working list of mammals from CARE. Entries in bold indicate changes made in 2002.

Common Name	Park Status	Data Source
dwarf shrew	Unconfirmed	Known from Henry Mts. (MSB)
Northern water shrew	Present	MSB
desert shrew	Present	Hoddenbach, 1978
California myotis	Present	MSB; USGS capture, 2001
Western small-footed bat	Present	MSB; USGS capture, 2001
long-eared myotis	Present	USGS voucher, 2001
little brown bat	Unconfirmed	fragmentary USGS acoustic file
fringed myotis	Present	MSB; USGS capture, 2001
long-legged myotis	Present	MSB; USGS capture, 2001
Yuma myotis	Present	MSB; USGS capture, 2001
silver-haired bat	Present	MSB; USGS capture, 2001
Western pipistrelle	Present	MSB; USGS capture, 2001
big brown bat	Present	MSB; USGS capture, 2001
hoary bat	Present	MSB; USGS capture, 2001
spotted bat	Present	MSB; USGS capture, 2001
Townsend's big-eared bat	Present	MSB; USGS capture, 2001
Allen's big-eared bat	Present	MSB; USGS capture, 2001
pallid bat	Present	MSB; USGS capture, 2001
Brazilian free-tailed bat	Present	MSB; USGS capture, 2001
big free-tailed bat	Present	USGS voucher, 2001
desert cottontail	Present	MSB; USGS observation, 2001
Nuttall's cottontail	Probably Present	
black-tailed jack rabbit	Present	MSB; USGS observation, 2001
white-tailed jack rabbit	Probably Present	
cliff chipmunk	Present	MSB; USGS capture, 2001
Hopi chipmunk	Present	MSB; USGS capture, 2001
yellow-bellied marmot	Present	NPS observation; USGS observation, 2001
white-tailed antelope squirrel	Present	MSB; USGS observation, 2002
rock squirrel	Present	MSB
red squirrel	Unconfirmed	
Botta's pocket gopher	Probably Present	Occurs near Notom
great basin pocket mouse	Present	MSB; USGS capture 2001
Ord's kangaroo rat	Present	MSB
beaver	Present	CARE observation file
Western harvest mouse	Present	MSB
brush mouse	Present	MSB; USGS capture 2001
canyon mouse	Present	MSB; USGS capture 2001

Table 27. Continued.

Common Name	Park Status	Data Source
deer mouse	Present	MSB; USGS capture 2001
piñon mouse	Present	MSB; USGS capture 2001
Northern grasshopper mouse	Present	MSB; USGS capture 2001
bushy-tailed woodrat	Present	MSB
desert woodrat	Present	MSB; USGS capture 2001
house mouse	Unconfirmed	
long-tailed vole	Present	MSB
Montane vole	Present	MSB
Muskrat	Present	NPS observation
porcupine	Present	NPS observation
coyote	Present	NPS observation; USGS observation, 2001
gray wolf	Unconfirmed	Likely occurred historically
kit fox	Probably Present	NPS observation (n = 1)
red fox	Present	NPS observation
gray fox	Present	NPS observation, USGS observation, 2001
American black bear	Present	NPS observation; USGS observation, 2001
grizzly bear	Unconfirmed	Likely occurred historically
Ringtail	Present	NPS observation; USGS observation, 2001
Raccoon	Present	NPS observation; USGS observation, 2001
ermine	Probably Present	NPS observation (n = 3)
long-tailed weasel	Probably Present	NPS observation (n = 1)
mink	Probably Present	NPS observation (n = 3)
badger	Present	NPS observation
Western spotted skunk	Present	NPS observation
striped skunk	Present	NPS observation
mountain lion	Present	NPS observation; USGS observation, 2001
bobcat	Present	NPS observation
wapiti	Present	NPS observation; USGS observation, 2001
mule deer	Present	NPS observation; USGS observation, 2001
pronghorn	Unconfirmed	
Bighorn sheep	Present	USGS voucher, 2001; extirp. 1934; transplanted
bison	Unconfirmed	transplanted from WY to UT in 1941.

Unconfirmed = unlikely to occur but retained for present; Probably Present = species likely to occur as range is near or includes park; Present = documented in some fashion.

Table 28. Current working list of mammals from CEBR. Entries in bold indicate changes made in 2002.

Common Name	Park Status	Data Source
masked shrew	Probably Present	
Merriam's shrew	Probably Present	
Montane shrew	Present	USGS voucher, 2001
Northern water shrew	Probably Present	
California myotis	Unconfirmed	USGS acoustic files, 2002
Western small-footed bat	Present	USGS voucher, 2002
long-eared myotis	Present	USGS voucher, 2002
little brown bat	Present	USGS voucher, 2001
Fringed myotis	Probably Present	
long-legged myotis	Present	USGS voucher, 2001
Yuma myotis	Unconfirmed	
hoary bat	Present	USGS acoustic files, 2002
silver-haired bat	Present	USGS voucher, 2002
Western pipistrelle	Unconfirmed	
big brown bat	Present	USGS capture, 2001
spotted bat	Present	USGS vocalizations, 2002
Townsend's big-eared bat	Probably Present	
Allen's big-eared bat	Unconfirmed	
pallid bat	Unconfirmed	
Brazilian free-tailed bat	Probably Present	
big free-tailed bat	Unconfirmed	
pika	Probably Present	
desert cottontail	Unconfirmed	
Nuttall's cottontail	Probably Present	
black-tailed jack rabbit	Unconfirmed	
white-tailed jack rabbit	Probably Present	
cliff chipmunk	Probably Present	
least chipmunk	Present	USGS voucher, 2001
Uinta chipmunk	Present	USGS voucher, 2001
yellow-bellied marmot	Present	USGS observation, 2001
golden-mantled ground squirrel	Present	USGS observation, 2001
rock squirrel	Probably Present	
red squirrel	Present	USGS observation, 2001
Northern flying squirrel	Present	USGS observation, 2002
Northern pocket gopher	Present	Hall, 1981; USGS voucher, 2001
great basin pocket mouse	Unconfirmed	
Western harvest mouse	Probably Present	

Table 28. Continued.

Common Name	Park Status	Data Source
brush mouse	Probably Present	
canyon mouse	Probably Present	
deer mouse	Present	USGS voucher, 2001
piñon mouse	Present	USGS voucher, 2002
bushy-tailed woodrat	Present	USGS capture, 2001
house mouse	Unconfirmed	
long-tailed vole	Present	USGS voucher, 2001
Montane vole	Present	USGS voucher, 2001
Western jumping mouse	Present	USGS voucher, 2002
porcupine	Present	USGS observation, 2001
coyote	Present	USGS observation, 2002
gray wolf	Unconfirmed	Likely occurred historically
red fox	Present	USGS observation, 2002
gray fox	Present	NPS observation, 2001
American black bear	Probably Present	
grizzly bear	Unconfirmed	Likely occurred historically
Ringtail	Probably Present	
Raccoon	Probably Present	
ermine	Present	USGS capture, 2001
long-tailed weasel	Present	USGS observation, 2001
badger	Present	USGS observation, 2001
Western spotted skunk	Probably Present	
striped skunk	Present	USGS capture, 2002
mountain lion	Present	USGS observation, 2001
bobcat	Present	USGS observation, 2001
wapiti	Present	USGS observation, 2001
mule deer	Present	USGS observation, 2001
Bighorn sheep	Probably Present	

Unconfirmed = unlikely to occur but retained for present; Probably Present = species likely to occur as range is near or includes park; Present = documented in some fashion.

Table 29. Current working list of mammals from CURE. Entries in bold indicate changes made in 2002.

Common Name	Park Status	Data Source
masked shrew	Present	USGS voucher,BLCA East Portal area, 2001
Montane shrew	Present	Durrant and Robinson, 1962
Northern water shrew	Present	USGS voucher, 2001
Preble's shrew	Probably Present	
California myotis	Unconfirmed	
Western small-footed bat	Present	Durrant and Robinson; USGS acoustic, '01
long-eared myotis	Present	USGS capture, 2001
little brown bat	Present	USGS voucher, 2001
fringed myotis	Probably Present	
long-legged myotis	Present	USGS voucher, 2001
Yuma myotis	Probably present	
hoary bat	Probably Present	
silver-haired bat	Present	USGS capture, 2001
Western pipistrelle	Probably Present	
big brown bat	Present	Durrant and Robinson; USGS acoustic, '01
spotted bat	Probably Present	
Townsend's big-eared bat	Probably Present	
pallid bat	Unconfirmed	
Brazilian free-tailed bat	Present	USGS acoustic files, 2002
big free-tailed bat	Present	USGS vocalization, 2001; acoustic files
desert cottontail	Unconfirmed	
Nuttall's cottontail	Present	Armstrong, 1972; USGS observation, 2001
snowshoe hare	Probably Present	
white-tailed jack rabbit	Present	Durrant and Robinson, 1962
least chipmunk	Present	USGS voucher, 2001
Colorado chipmunk	Present	Armstrong, 1972; USGS voucher, 2001
Hopi chipmunk	Present	USGS observation, Cimarron, 2002
yellow-bellied marmot	Present	Armstrong, 1972; USGS observation, 2001
golden-mantled ground squirrel	Present	USGS voucher, 2001
rock squirrel	Present	USGS voucher, 2001
Gunnison's prairie dog	Present	USGS observation, 2001
white-tailed prairie dog	Present	Cimarron (Armstrong, 1972)
red squirrel	Present	USGS voucher, 2001
Northern pocket gopher	Present	Durrant and Robinson, 1962
beaver	Present	USGS, tree cuttings, 2001
Western harvest mouse	Unconfirmed	
brush mouse	Present	USGS voucher, 2001

Table 29. Continued.

Common Name	Park Status	Data Source
canyon mouse	Probably Present	
deer mouse	Present	USGS voucher, 2001
piñon mouse	Unconfirmed	
bushy-tailed woodrat	Present	Durrant and Robinson, 1962
house mouse	Unconfirmed	
southern red-backed vole	Present	Armstrong, 1972
long-tailed vole	Present	USGS voucher, 2001
Montane vole	Present	USGS voucher, 2001
Meadow vole	Present	USGS voucher, 2001
Muskrat	Present	NPS observation, Ken Stalnecker
Western jumping mouse	Present	USGS voucher, 2001
porcupine	Present	USGS observation, 2001
coyote	Present	USGS, vocalization, 2001
gray wolf	Unconfirmed	Likely occurred historically
red fox	Present	UGS observation, 2001
gray fox	Present	USGS observation, 2001 (near park)
American black bear	Probably Present	
grizzly bear	Unconfirmed	Likely occurred historically
Ringtail	Present	USGS observation, 2002
Raccoon	Present	USGS observation, 2002
marten	Unconfirmed	
ermine	Unconfirmed	
long-tailed weasel	Present	NPS observation, Ken Stalnecker
mink	Unconfirmed	
badger	Present	NPS obs., Ken Stalnecker
river otter	Present	NPS obs., Ken Stalnecker; reintroduced
Western spotted skunk	Probably Present	
striped skunk	Present	NPS observation, Ken Stalnecker
mountain lion	Present	USGS interview (reliable local report)
bobcat	Present	USGS observation, 2001 (mounted skin)
wapiti	Present	USGS, scat, 2001
mule deer	Present	USGS observation, 2001
bison	Unconfirmed	May have occurred historically
Bighorn sheep	Present	NPS staff report and photos.

Unconfirmed = unlikely to occur but retained for present; Probably Present = species likely to occur as range is near or includes park; Present = documented in some fashion.

Table 30. Current working list of mammals from FOBU. Entries in bold indicate changes made in 2002.

Common Name	Park Status	Data Source
masked shrew	Probably Present	
montane shrew	Present	USGS voucher, 2002
dwarf shrew	Unconfirmed	
Northern water shrew	Unconfirmed	
vagrant shrew	Unconfirmed	
California myotis	Unconfirmed	
Western small-footed bat	Present	USGS acoustic files, 2001, 2002
long-eared myotis	Present	USGS capture, 2001
little brown bat	Present	USGS capture, 2001
fringed myotis	Probably Present	
long-legged myotis	Present	USGS capture, 2001
Yuma myotis	Present	USGS voucher, 2002
hoary bat	Probably Present	
silver-haired bat	Present	USGS acoustic files, 2001, 2002
big brown bat	Present	USGS acoustic files, 2001
spotted bat	Probably Present	
Townsend's big-eared bat	Present	USGS acoustic files, 2001
pallid bat	Unconfirmed	
Brazilian free-tailed bat	Present	USGS acoustic files, 2001
big free-tailed bat	Probably Present	
desert cottontail	Present	Clark, 1977
pygmy rabbit	Unconfirmed	
Nuttall's cottontail	Present	USGS observation, 2001; FOBU collection
snowshoe hare	Probably Present	
black-tailed jack rabbit	Unconfirmed	
white-tailed jack rabbit	Present	Clark, 1977; USGS observation, 2001; 2002
yellow-pine chipmunk	Present	USGS voucher, 2002; FOBU collection
least chipmunk	Present	USGS capture, 2001, voucher, 2002
yellow-bellied marmot	Present	USGS observation, 2002
Uinta ground squirrel	Present	Clark, 1977
Wyoming ground squirrel	Present	USGS obs., 2002; FOBU collection
golden-mantled ground squirrel	Present	FOBU collection
white-tailed prairie dog	Present	Clark, 1977
red squirrel	Present	Clark, 1977
Northern pocket gopher	Present	USGS voucher, 2001
great basin pocket mouse	Present	USGS capture, 2001
beaver	Present	Clark, 1977; USGS observation, 2001

Table 30. Continued.

Common Name	Park Status	Data Source
deer mouse	Present	USGS capture, 2001, voucher, 2002
Northern grasshopper mouse	Present	USGS capture, 2001
bushy-tailed woodrat	Present	USGS capture, 2001, voucher 2002
house mouse	Unconfirmed	
southern red-backed vole	Present	Dorn et. al.
long-tailed vole	Present	Clark, 1977; USGS capture, 2001
montane vole	Present	USGS capture, 2001, voucher 2002
Meadow vole	Present	Clark, 1977; USGS capture, 2001
Sagebrush vole	Present	Clark, 1977
Western jumping mouse	Present	USGS capture, 2001
porcupine	Present	Clark, 1977; USGS observation, 2001
coyote	Present	Clark, 1977; USGS observation, 2001
gray wolf	Unconfirmed	Likely occurred historically
red fox	Present	USGS observation, 2002
American black bear	Probably Present	
grizzly bear	Unconfirmed	Likely occurred historically
Ringtail	Unconfirmed	
Raccoon	Probably Present	
marten	Unconfirmed	
ermine	Present	USGS voucher, 2001
long-tailed weasel	Present	Clark, 1977
black-footed ferret	Unconfirmed	
mink	Unconfirmed	
badger	Present	Clark, 1977; USGS observation 2002
Western spotted skunk	Probably Present	
striped skunk	Present	Clark, 1977
Mountain lion	Present	USGS observation, 2002
bobcat	Present	USGS observation, 2002
wapiti	Present	Clark, 1977; USGS observation 2001
mule deer	Present	Clark, 1977; USGS observation 2001
moose	Present	Clark, 1977; USGS observation 2001
pronghorn	Present	USGS observation, 2001
bison	Unconfirmed	May have occurred historically

Unconfirmed = unlikely to occur but retained for present; Probably Present = species likely to occur as range is near or includes park; Present = documented in some fashion.

Table 31. Current working list of mammals from GOSP. Entries in bold denote changes made in 2002.

Common Name	Park Status	Data Source
masked shrew	Probably Present	
Merriam's shrew	Probably Present	
northern water shrew	Probably Present	
Preble's shrew	Probably Present	
vagrant shrew	Probably Present	
California myotis	Unconfirmed	
western small-footed bat	Present	USGS voucher, 2002
long-eared myotis	Probably Present	
little brown bat	Present	USGS acoustic files, 2002
fringed myotis	Probably Present	
long-legged myotis	Probably Present	
Yuma myotis	Unconfirmed	
hoary bat	Unconfirmed	
silver-haired bat	Unconfirmed	
western pipistrelle	Present	USGS acoustic files, 2001
Big brown bat	Present	USGS voucher, 2001
spotted bat	Unconfirmed	
Townsend's big-eared bat	Unconfirmed	
pallid bat	Unconfirmed	
desert cottontail	Present	USGS observation, 2002
pygmy rabbit	Probably Present	
Nuttall's cottontail	Present	USGS observation, 2001
snowshoe hare	Unconfirmed	
black-tailed jack rabbit	Present	USGS observation, 2002
white-tailed jack rabbit	Probably Present	
cliff chipmunk	Unconfirmed	
least chipmunk	Unconfirmed	
yellow-bellied marmot	Present	USGS voucher, 2001 (skull)
white-tailed antelope squirrel	Unconfirmed	
Piute ground squirrel	Present	Hall, 1981 "Promontory"
rock squirrel	Probably Present	
northern flying squirrel	Unconfirmed	
Botta's pocket gopher	Unconfirmed	
northern pocket gopher	Present	USGS voucher, 2001 (partial skull)
great basin pocket mouse	Present	USGS capture, 2001
Ord's kangaroo rat	Present	USGS capture, 2001
western harvest mouse	Present	USGS capture, 2001

Table 31. Continued.

Common Name	Park Status	Data Source
brush mouse	Unconfirmed	
deer mouse	Present	USGS voucher, 2001
northern grasshopper mouse	Unconfirmed	
bushy-tailed woodrat	Present	USGS capture, 2001
house mouse	Unconfirmed	
long-tailed vole	Present	USGS voucher, 2001
montane vole	Present	USGS voucher, 2001
meadow vole	Unconfirmed	
Sagebrush vole	Probably Present	
muskrat	Present	USGS observation, 2002
western jumping mouse	Unconfirmed	
porcupine	Present	NPS observation
coyote	Present	USGS observation, 2001
gray wolf	Unconfirmed	Likely occurred historically
Kit fox	Unconfirmed	
Red fox	Present	NPS observation
gray fox	Unconfirmed	
American black bear	Probably Present	
grizzly bear	Unconfirmed	May have occurred historically
Ringtail	Unconfirmed	
Raccoon	Present	NPS observation
long-tailed weasel	Present	USGS salvaged part cranium, 2001
mink	Unconfirmed	
badger	Present	USGS voucher, 2001 (skull)
western spotted skunk	Probably Present	
striped skunk	Present	NPS observation/slide
Mountain lion	Present	USGS observation, 2002
bobcat	Present	USGS observation, 2002
mule deer	Present	USGS observation, 2001
pronghorn	Present	NPS observation
bison	Unconfirmed	May have occurred historically

Unconfirmed = unlikely to occur but retained for present; Probably Present = species likely to occur as range is near or includes park; Present = documented in some fashion.

Table 32. Current working list of mammals from HOVE. Entries in bold denote changes made in 2002.

Common Name	Park Status	Data Source
Merriam's shrew	Present	<i>fide</i> Rado, park list
dwarf shrew	Probably Present	
Preble's shrew	Probably Present	
desert shrew	Probably Present	
California myotis	Present	USGS capture, 2001
western small-footed bat	Present	USGS capture, 2001
long-eared myotis	Present	USGS capture, 2001
little brown bat	Unconfirmed	
fringed myotis	Present	USGS capture, 2001
long-legged myotis	Probably Present	
Yuma myotis	Unconfirmed	
hoary bat	Unconfirmed	
silver-haired bat	Unconfirmed	
western pipistrelle	Present	USGS capture, 2001
big brown bat	Probably present	
spotted bat	Probably Present	
Townsend's big-eared bat	Probably Present	
Allen's big-eared bat	Probably Present	
pallid bat	Present	USGS capture, 2001
Brazilian free-tailed bat	Unconfirmed	
big free-tailed bat	Unconfirmed	
desert cottontail	Present	USGS observation, 2001
Nuttall's cottontail	Probably Present	
black-tailed jack rabbit	Present	USGS observation, 2001
white-tailed jack rabbit	Unconfirmed	
least chipmunk	Present	USGS capture, 2001
Hopi chipmunk	Present	USGS voucher, 2001
white-tailed antelope squirrel	Present	USGS observation, 2002, Cajon Unit
spotted ground squirrel	Probably Present	
rock squirrel	Present	USGS observation, 2001
Gunnison's prairie dog	Unconfirmed	USGS observation, 2001
Botta's pocket gopher	Present	USGS observation, 2001, Goodman Pt.
plains pocket mouse	Probably Present	
silky pocket mouse	Present	USGS capture, 2001
Ord's kangaroo rat	Present	USGS observation, 2002, Cajon Unit
western harvest mouse	Present	USGS voucher, 2001
brush mouse	Present	USGS voucher, 2001

Table 32. Continued.

Common Name	Park Status	Data Source
canyon mouse	Present	USGS voucher, 2001
deer mouse	Present	USGS voucher, 2001
piñon mouse	Present	USGS voucher, 2001
northern grasshopper mouse	Present	<i>fide</i> Rado, park list
white-throated woodrat	Present	USGS voucher, 2001
bushy-tailed woodrat	Present	USGS voucher, 2002
Mexican woodrat	Present	USGS voucher, 2001
house mouse	Unconfirmed	
long-tailed vole	Unconfirmed	
muskrat	Unconfirmed	
porcupine	Present	<i>fide</i> Rado, park list
coyote	Present	USGS observation, 2001
gray wolf	Unconfirmed	Likely occurred historically
kit fox	Probably Present	
red fox	Present	USGS observation, 2001
gray fox	Probably Present	
American black bear	Probably Present	
grizzly bear	Unconfirmed	Likely occurred historically
Ringtail	Present	USGS observation, 2002
Raccoon	Present	USGS observation, 2002
long-tailed weasel	Present	NPS observation
badger	Present	Rado
western spotted skunk	Present	USGS observation, 2002
striped skunk	Present	Rado
Mountain lion	Present	USGS observation, 2001
bobcat	Present	USGS observation, 2001
wapiti	Probably Present	
mule deer	Present	USGS observation, 2002

Unconfirmed = unlikely to occur but retained for present; Probably Present = species likely to occur as range is near or includes park; Present = documented in some fashion.

Table 33. Current working list of mammals from PISP. Entries in bold denote changes made in 2002.

Common Name	Park Status	Data Source
Merriam's shrew	Probably Present	
montane shrew	Unconfirmed	
dwarf shrew	Probably Present	
desert shrew	Probably Present	
California myotis	Present	USGS voucher, 2001
western small-footed bat	Present	USGS voucher, 2001
long-eared myotis	Unconfirmed	
little brown bat	Present	USGS acoustic files, 2002
fringed myotis	Present	USGS capture, 2001
long-legged myotis	Present	USGS capture, 2001
Yuma myotis	Present	USGS capture, 2001
western red bat	Unconfirmed	
hoary bat	Probably Present	
silver-haired bat	Probably Present	
western pipistrelle	Present	USGS capture, 2001
big brown bat	Present	USGS capture, 2001
spotted bat	Probably Present	
Townsend's big-eared bat	Present	USGS acoustic files, 2002
Allen's big-eared bat	Present	MSB; USGS capture, 2001
pallid bat	Present	USGS capture, 2001
Brazilian free-tailed bat	Present	MSB
big free-tailed bat	Unconfirmed	
desert cottontail	Present	USGS observation, 2001, 2002
Nuttall's cottontail	Unconfirmed	
black-tailed jack rabbit	Probably Present	
cliff chipmunk	Present	USGS voucher, 2002
least chipmunk	Unconfirmed	
white-tailed antelope squirrel	Present	Hoffmeister, 1986
rock squirrel	Present	USGS observation, 2001
Botta's pocket gopher	Present	Hoffmeister, 1986; USGS voucher, 2001
long-tailed pocket mouse	Present	Hoffmeister, 1986; USGS capture, 2001
little pocket mouse	Present	Hoffmeister, 1986
great basin pocket mouse	Probably Present	
chisel-toothed kangaroo rat	Present	USGS voucher, 2002
Ord's kangaroo rat	Present	Hoffmeister, 1986
western harvest mouse	Present	Hoffmeister, 1986; USGS voucher, 2001

Table 33. Continued.

Common Name	Park Status	Data Source
brush mouse	Probably Present	
canyon mouse	Present	Hoffmeister, 1986; USGS voucher, 2001
cactus mouse	Present	USGS voucher, 2002
deer mouse	Present	Hoffmeister, 1986; USGS voucher, 2001
piñon mouse	Present	USGS voucher, 2001
northern grasshopper mouse	Present	Hoffmeister, 1986
desert woodrat	Present	Hoffmeister, 1986; USGS voucher, 2001
house mouse	Unconfirmed	
muskrat	Unconfirmed	
Porcupine	Present	NPS observation
coyote	Present	USGS observation, 2002
gray wolf	Unconfirmed	Likely occurred historically
kit fox	Unconfirmed	
red fox	Unconfirmed	
gray fox	Present	NPS observation
American black bear	Unconfirmed	
grizzly bear	Unconfirmed	Likely occurred historically
Ringtail	Probably Present	
Raccoon	Probably Present	
long-tailed weasel	Probably Present	
badger	Present	USGS observation, 2001
western spotted skunk	Probably Present	
striped skunk	Probably Present	
Mountain lion	Unconfirmed	
bobcat	Present	USGS voucher, 2002 (mandible)
mule deer	Probably Present	

Unconfirmed = unlikely to occur but retained for present; Probably Present = species likely to occur as range is near or includes park; Present = documented in some fashion.

Table 34. Current working list of mammals from TICA. Entries in bold denote changes made in 2002.

Common Name	Park Status	Data Source
masked shrew	Probably Present	
Merriam's shrew	Probably Present	
montane shrew	Present	TICA collection
dwarf shrew	Probably Present	
northern water shrew	Unconfirmed	
Preble's shrew	Probably Present	
vagrant shrew	Probably Present	
California myotis	Unconfirmed	
western small-footed bat	Present	USGS acoustic files, 2001
long-eared myotis	Present	USGS voucher, 2002; TICA collection
little brown bat	Present	USGS voucher, 2002
fringed myotis	Probably Present	
long-legged myotis	Probably Present	
Yuma myotis	Present	USGS acoustic files, 2002
hoary bat	Probably Present	
silver-haired bat	Probably Present	
western pipistrelle	Unconfirmed	
big brown bat	Present	USGS acoustic files, 2002
spotted bat	Probably Present	
Townsend's big-eared bat	Present	USGS observation, 2002
pallid bat	Unconfirmed	
Brazilian free-tailed bat	Present	USGS acoustic files, 2001
big free-tailed bat	Present	USGS, audible vocalization, 2001
Pika	Unconfirmed	
pygmy rabbit	Unconfirmed	
Nuttall's cottontail	Present	NPS observation; USGS observ., 2002
snowshoe hare	Present	NPS observation
black-tailed jack rabbit	Unconfirmed	
white-tailed jack rabbit	Probably Present	
cliff chipmunk	Present	USGS voucher, 2002
least chipmunk	Present	USGS observation, 2002
Uinta chipmunk	Present	USGS capture, 2001
yellow-bellied marmot	Present	TICA collection
golden-mantled ground squirrel	Present	USGS observation, 2001
rock squirrel	Present	USGS observation, 2001
red squirrel	Present	USGS observation, 2002; TICA collection
northern flying squirrel	Present	TICA collection
northern pocket gopher	Probably Present	
great basin pocket mouse	Unconfirmed	

Table 34. Continued.

Common Name	Park Status	Data Source
beaver	Present	NPS observation
western harvest mouse	Present	USGS capture, 2001
brush mouse	Present	TICA collection
deer mouse	Present	USGS capture, 2001
piñon mouse	Unconfirmed	
bushy-tailed woodrat	Present	USGS capture, 2001; voucher, 2002
house mouse	Unconfirmed	
southern red-backed vole	Unconfirmed	
long-tailed vole	Present	TICA collection
montane vole	Present	TICA collection
meadow vole	Present	TICA collection
muskrat	Unconfirmed	
western jumping mouse	Present	USGS voucher, 2002
porcupine	Probably Present	
coyote	Present	USGS observation, 2002
gray wolf	Unconfirmed	Likely occurred historically
red fox	Present	NPS observation
gray fox	Probably Present	
American black bear	Present	NPS observation
grizzly bear	Unconfirmed	Likely occurred historically
Ringtail	Present	USGS observation, 2001
Raccoon	Present	NPS observation
marten	Unconfirmed	
ermine	Probably Present	
long-tailed weasel	Present	NPS observation
mink	Present	NPS observation, 2001
badger	Unconfirmed	
western spotted skunk	Present	NPS observation
striped skunk	Present	USGS observation, 2002
Mountain lion	Present	USGS observation, 2002
bobcat	Present	TICA collection
wapiti	Present	USGS observation, 2002
mule deer	Present	USGS observation, 2001
moose	Present	USGS observation, 2002
Mountain goat	Present	NPS observation, 2001

Unconfirmed = unlikely to occur but retained for present; Probably Present = species likely to occur as range is near or includes park; Present = documented in some fashion.

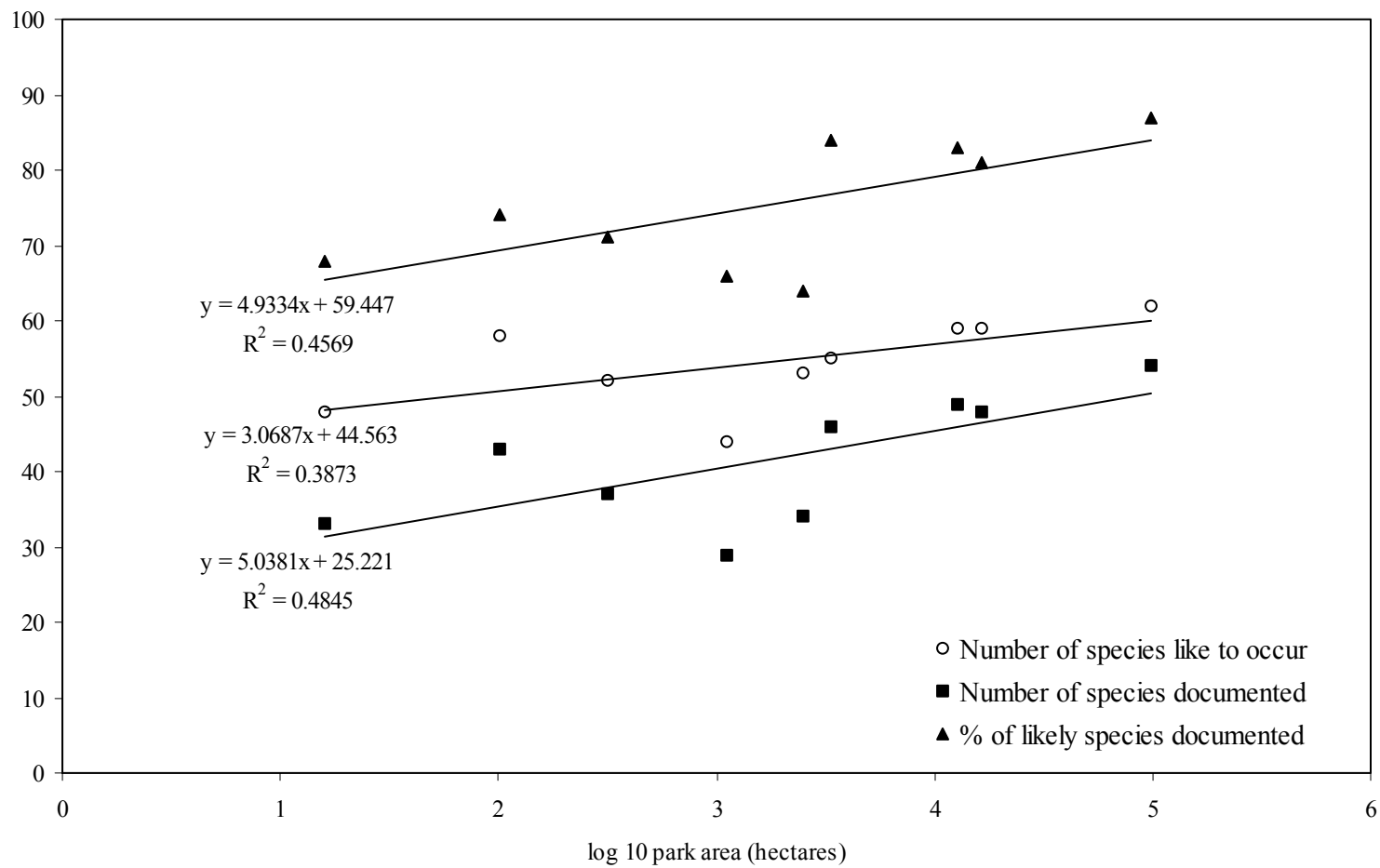


Figure 1. Relationship between park size (log 10 hectares) and number of species likely to occur, number of species documented, and percent of likely species documented.

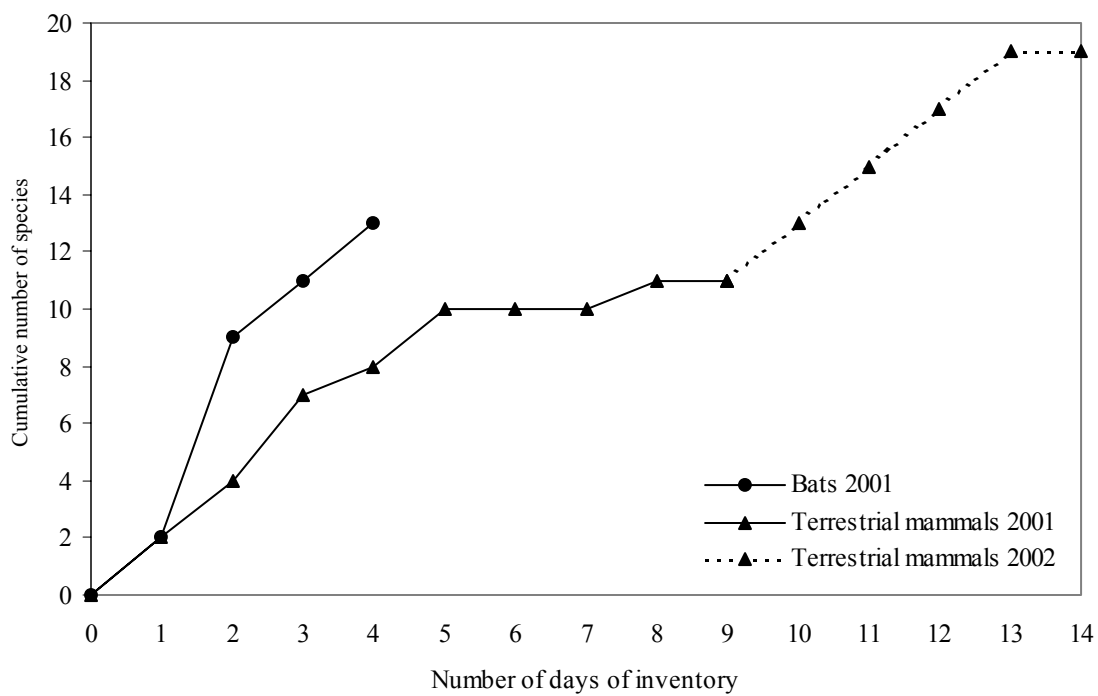


Figure 2. Species accumulation curves for BLCA, 2001 and 2002.

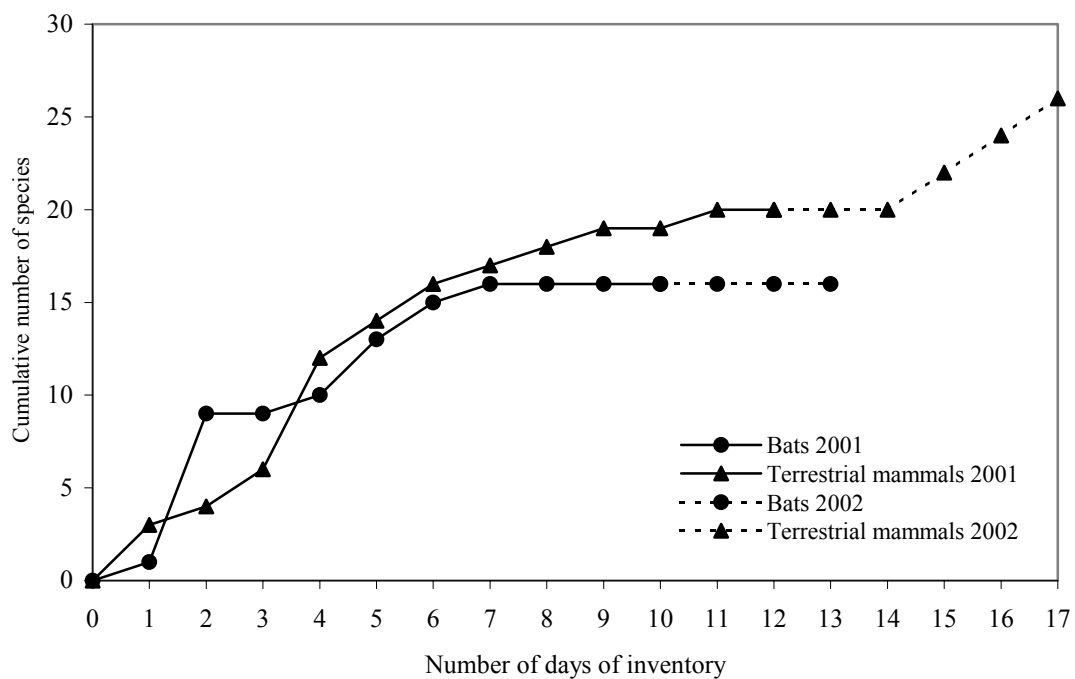


Figure 3. Species accumulation curves for CARE, 2001 and 2002.

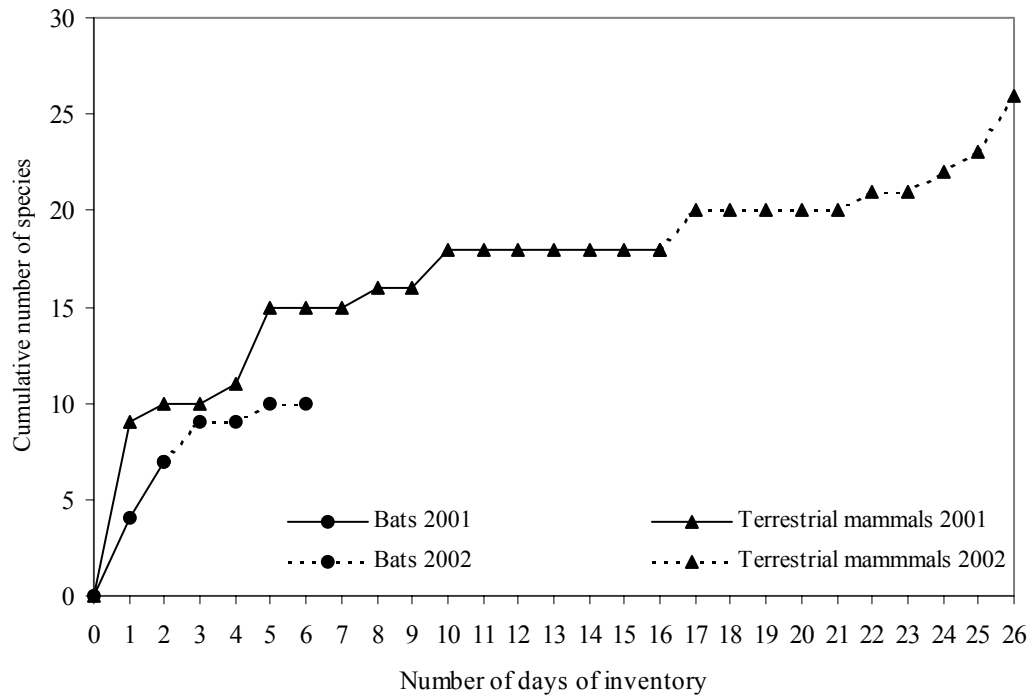


Figure 4. Species accumulation curves for CEBR, 2001 and 2002.

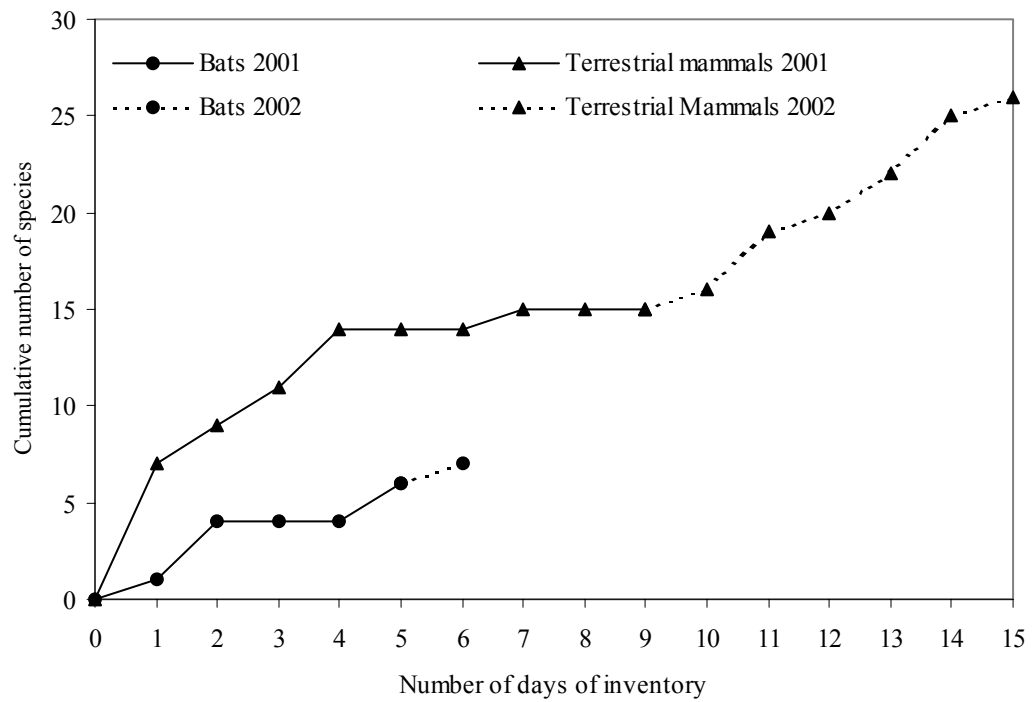


Figure 5. Species accumulation curves for CURE, 2001 and 2002.

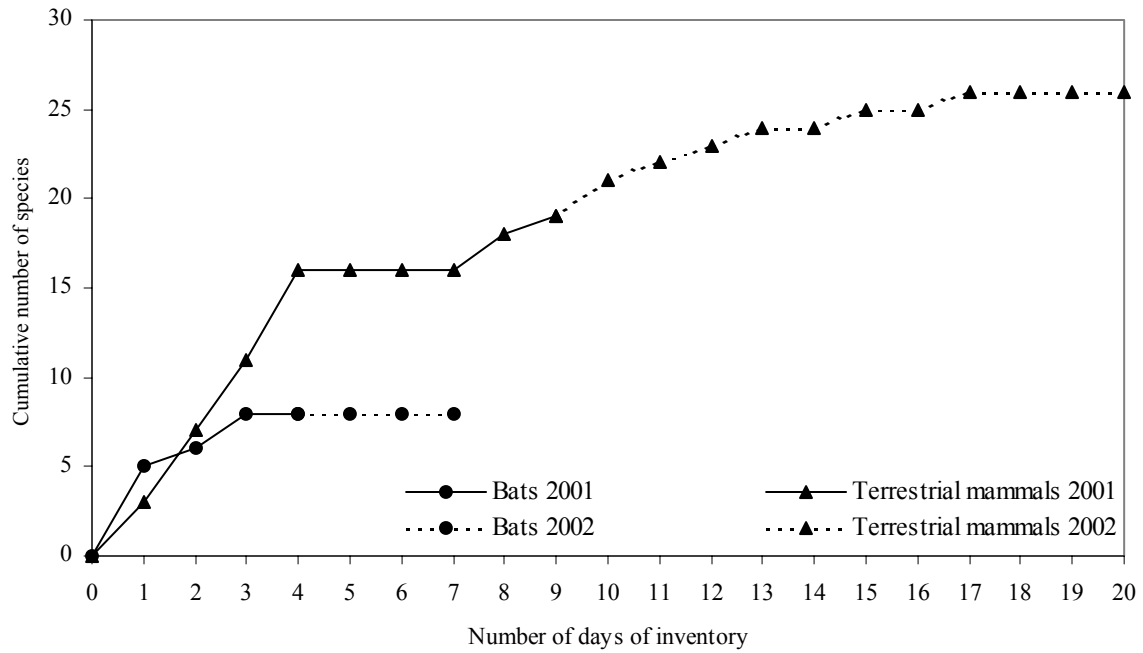


Figure 6. Species accumulation curves for FOBU, 2001 and 2002.

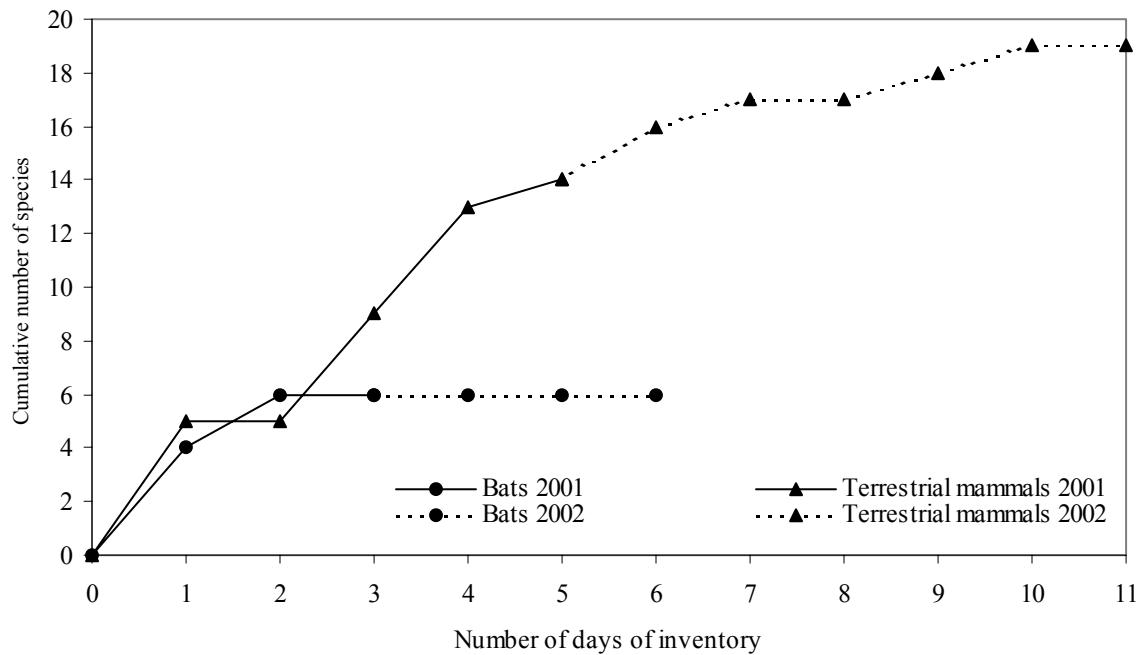


Figure 7. Species accumulation curves for GOSP, 2001 and 2002.

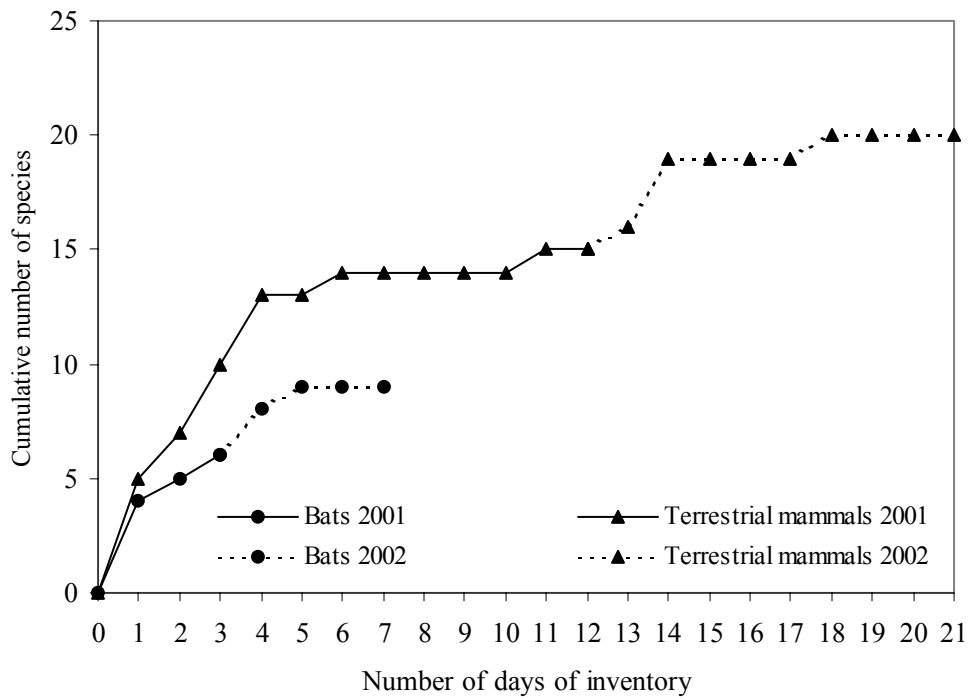


Figure 8. Species accumulation curves for HOVE, 2001 and 2002.

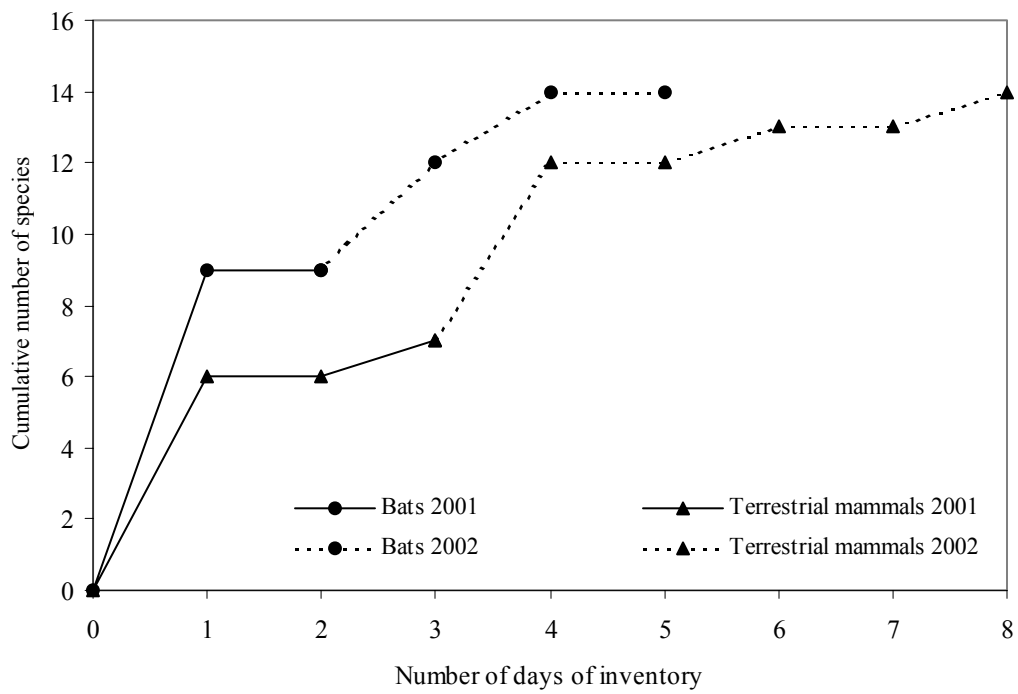


Figure 9. Species accumulation curves for PISP, 2001 and 2002.

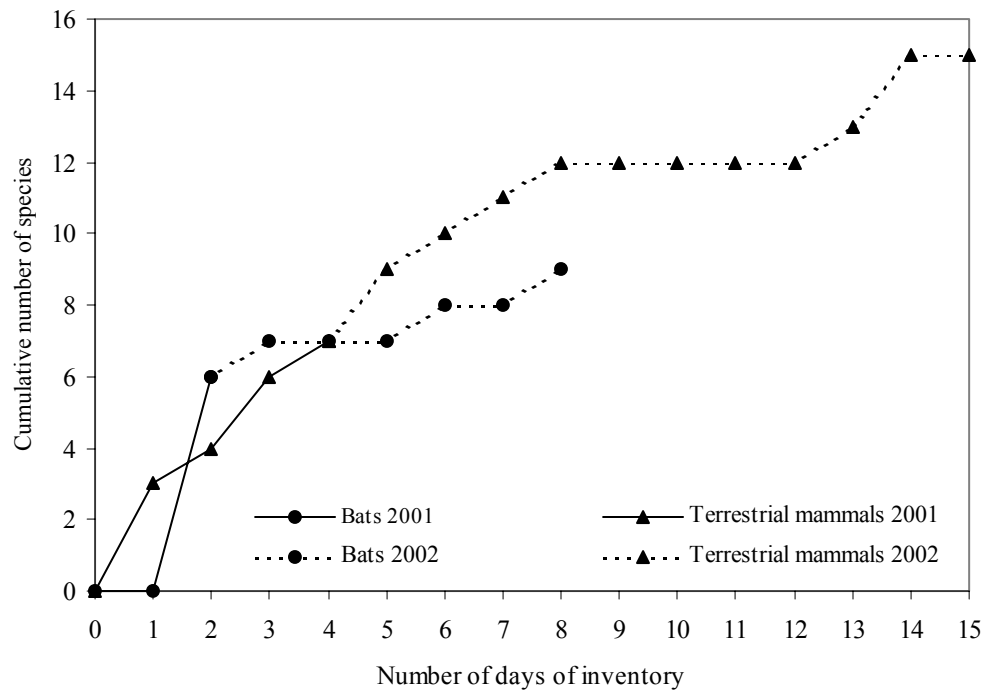


Figure 10. Species accumulation curves for TICA, 2001 and 2002.

Appendices

Appendix A. Common name and Latin name of species mentioned in this report.

Species common name	Species Latin name
Desert shrew	<i>Notiosorex crawfordi</i>
Masked shrew	<i>Sorex cinereus</i>
Montane shrew	<i>S. monticolus</i>
Northern water shrew	<i>S. palustris</i>
Preble's shrew	<i>S. preblei</i>
California myotis	<i>Myotis californicus</i>
Western small-footed myotis	<i>M. ciliolabrum</i>
Long-eared myotis	<i>M. evotis</i>
Little brown bat	<i>M. lucifugus</i>
Fringed myotis	<i>M. thysanodes</i>
Long-legged myotis	<i>M. volans</i>
Yuma myotis	<i>M. yumanensis</i>
Silver-haired bat	<i>Lasionycteris noctivagans</i>
Western pipistrelle	<i>Pipistrellus hesperus</i>
Big brown bat	<i>Eptesicus fuscus</i>
Western red bat	<i>Lasiurus blossevillei</i>
Hoary bat	<i>L. cinereus</i>
Spotted bat	<i>Euderma maculatum</i>
Townsend's big-eared bat	<i>Corynorhinus townsendii</i>
Allen's big-eared bat	<i>Idionycteris phyllotis</i>
Pallid bat	<i>Antrozous pallidus</i>
Western mastiff bat	<i>Eumops perotis</i>
Brazilian free-tailed bat	<i>Tadarida brasiliensis</i>
Big free-tailed bat	<i>Nyctinomops macrotis</i>
Desert cottontail	<i>Sylvilagus audubonii</i>
Nuttall's cottontail	<i>S. nuttallii</i>
Snowshoe hare	<i>Lepus americanus</i>
Black-tailed jack rabbit	<i>L. californicus</i>
White-tailed jack rabbit	<i>L. townsendii</i>
Yellow pine chipmunk	<i>Eutamias amoenus</i>
Cliff chipmunk	<i>E. dorsalis</i>
Least chipmunk	<i>E. minimus</i>
Colorado chipmunk	<i>E. quadrivittatus</i>
Hopi chipmunk	<i>E. rufus</i>
Uinta chipmunk	<i>E. umbrinus</i>
Yellow-bellied marmot	<i>Marmota flaviventris</i>
White-tailed antelope squirrel	<i>Ammospermophilus leucurus</i>
Wyoming ground squirrel	<i>Spermophilus elegans</i>
Golden-mantled ground squirrel	<i>S. lateralis</i>
Rock squirrel	<i>S. variegatus</i>
Gunnison's prairie dog	<i>Cynomys gunnisoni</i>
Red squirrel	<i>Tamiasciurus hudsonicus</i>
Botta's pocket gopher	<i>Thomomys bottae</i>

Appendix A. Continued.

Species common name	Species Latin name
Northern pocket gopher	<i>T. talpoides</i>
Silky pocket mouse	<i>Perognathus flavus</i>
Great Basin pocket mouse	<i>P. parvus</i>
Long-tailed pocket mouse	<i>Chaetodipus formosus</i>
Ord's kangaroo rat	<i>Dipodomys ordii</i>
Beaver	<i>Castor canadensis</i>
Western harvest mouse	<i>Reithrodontomys megalotis</i>
Brush mouse	<i>Peromyscus boylii</i>
Canyon mouse	<i>P. crinitus</i>
Cactus mouse	<i>P. eremicus</i>
Deer mouse	<i>P. maniculatus</i>
Pinon mouse	<i>P. truei</i>
Northern grasshopper mouse	<i>Onychomys leucogaster</i>
White-throated woodrat	<i>Neotoma albigula</i>
Bushy-tailed woodrat	<i>N. cinerea</i>
Desert woodrat	<i>N. lepida</i>
Mexican woodrat	<i>N. mexicana</i>
Southern red-backed vole	<i>Clethrionomys gapperi</i>
Long-tailed vole	<i>Microtus longicaudus</i>
Montane vole	<i>M. montanus</i>
Meadow vole	<i>M. pennsylvanicus</i>
Muskrat	<i>Ondatra zibethicus</i>
Western jumping mouse	<i>Zapus princeps</i>
Porcupine	<i>Erethizon dorsatum</i>
Coyote	<i>Canis latrans</i>
Red fox	<i>Vulpes vulpes</i>
Gray fox	<i>Urocyon cinereoargenteus</i>
American black bear	<i>Ursus americanus</i>
Ringtail	<i>Bassariscus astutus</i>
Raccoon	<i>Procyon lotor</i>
Ermine	<i>Mustela erminea</i>
Long-tailed weasel	<i>M. frenata</i>
Mink	<i>M. vison</i>
Badger	<i>Taxidea taxus</i>
Western spotted skunk	<i>Spilogale gracilis</i>
Striped skunk	<i>Mephitis mephitis</i>
Mountain lion	<i>Puma concolor</i>
Bobcat	<i>Lynx rufus</i>
Elk	<i>Cervus elaphus</i>
Mule deer	<i>Odocoileus hemionus</i>
Moose	<i>Alces alces</i>
Bighorn sheep	<i>Ovis canadensis</i>
Pronghorn	<i>Antilocapra americana</i>
Mountain goat	<i>Oreamnos americanus</i>

Appendix B. Key to abbreviations used on field data sheets and in electronic dataset.

Abbreviation	Definition
a	adult
dit	dead in trap
dor	dead on road
e	ear measurement (mm)
escape	animal escaped prior to complete assessment
f	female
hf	hind foot measurement (mm)
j	juvenile
l	lactating
m	male
nl	non-lactating
nr	non-reproductive
ns	non-scrotal
p	pregnant
pl	post-lactating
rhf	right hind foot measurement (mm)
s	scrotal
sa	sub-adult
t	tail measurement (mm)
CAR 4799	voucher specimen prepared by Cindy A. Ramotnik, number 4799 in personal catalog

Appendix C. List of field technicians who worked on 2001 or 2002 mammalian inventories, including academic affiliation and degree status when work was performed.

Name	Academic affiliation	Degree status
Grant Alban	Humboldt State University Arcata, CA	Undergraduate
Danyett T. Chavez	University of New Mexico Albuquerque, NM	Bachelor of Science
Jennifer Erickson	Tarleton State University Stephenville, TX	Bachelor of Science
Teresa P. Hayward	Montana Tech Butte, MT	Undergraduate
Jennifer G. Jurney	Tarleton State University Stephenville, TX	Bachelor of Science
Rogelio Rodriguez	Angelo State University San Angelo, TX	Bachelor of Science
Emory C. Taylor	University of New Mexico Albuquerque, NM	Bachelor of Science
Catherine Viana	University of New Mexico Albuquerque, NM	Master of Arts

Appendix D. Voucher specimens collected on BLCA, CARE, CEBR, CURE, FOBU, GOSP, HOVE, PISP and TICA during 2001 and 2002.

Park code	Date	Species common name	Collector name	Collector number	NPS accession number	NPS catalog number	MSB accession no.
BLCA	07/22/01	deer mouse	D. T. Chavez	DTC 30			282
BLCA	07/22/01	masked shrew	D. T. Chavez	DTC 28			282
BLCA	07/22/01	brush mouse	D. T. Chavez	DTC 29			282
BLCA	07/24/01	montane vole	D. T. Chavez	DTC 31	60	1083	282
BLCA	07/25/01	canyon mouse	C. A. Ramotnik	CAR 4814	60	1087	282
BLCA	07/25/01	piñon mouse	C. A. Ramotnik	CAR 4813	60	1086	282
BLCA	07/25/01	piñon mouse	C. A. Ramotnik	CAR 4811	60	1084	282
BLCA	07/25/01	piñon mouse	C. A. Ramotnik	CAR 4812	60	1085	282
BLCA	08/04/01	least chipmunk	C. A. Ramotnik	CAR 4816	60	1088	285
BLCA	08/04/01	brush mouse	C. A. Ramotnik	CAR 4817	60	1089	285
BLCA	08/05/01	Hopi chipmunk	D. T. Chavez	DTC 33	60	1095	285
BLCA	08/05/01	golden-mantled ground squirrel	D. T. Chavez	DTC 34	60	1096	285
BLCA	08/05/01	Hopi chipmunk	D. T. Chavez	DTC 16	60	1090	285
BLCA	08/05/01	bushy-tailed woodrat	D. T. Chavez	DTC 32	60	1094	285
BLCA	08/05/01	brush mouse	D. T. Chavez	DTC 17	60	1091	285
BLCA	08/05/01	canyon mouse	D. T. Chavez	DTC 18	60	1092	285
BLCA	08/05/01	piñon mouse	D. T. Chavez	DTC 19	60	1093	285
BLCA	08/06/01	brush mouse	M. A. Bogan	MAB 6848	60	1099	285
BLCA	08/06/01	brush mouse	M. A. Bogan	MAB 6847	60	1098	285
BLCA	08/06/01	canyon mouse	M. A. Bogan	MAB 6849	60	1100	285
BLCA	08/06/01	piñon mouse	M. A. Bogan	MAB 6850	60	1101	285
BLCA	08/06/01	piñon mouse	M. A. Bogan	MAB 6851	60	1102	285
BLCA	08/06/01	deer mouse	M. A. Bogan	MAB 6846	60	1097	285

Appendix D. Continued.

Park code	Date	Species common name	Collector name	Collector number	NPS accession number	NPS catalog number	MSB accession no.
BLCA	08/07/01	brush mouse	C. A. Ramotnik	CAR 4818	60	1103	285
BLCA	08/07/01	brush mouse	C. A. Ramotnik	CAR 4819	60	1104	285
BLCA	08/07/01	brush mouse	C. A. Ramotnik	CAR 4820	60	1105	285
BLCA	08/08/01	brush mouse	D. T. Chavez	DTC 36	60	1107	285
BLCA	08/08/01	hoary bat	E. W. Valdez	EWV 1380	60	1112	289
BLCA	08/08/01	Long-eared myotis	E. W. Valdez	EWV 1376	60	1108	289
BLCA	08/08/01	Long-eared myotis	E. W. Valdez	EWV 1377	60	1109	289
BLCA	08/08/01	long-legged myotis	E. W. Valdez	EWV 1378	60	1110	289
BLCA	08/08/01	long-legged myotis	E. W. Valdez	EWV 1379	60	1111	289
BLCA	08/08/01	Northern pocket gopher	D. T. Chavez	DTC 35	60	1106	285
BLCA	08/09/01	brush mouse	M. A. Bogan	MAB 6852	60	1113	285
BLCA	08/09/01	brush mouse	M. A. Bogan	MAB 6853	60	1114	285
BLCA	08/09/01	big brown bat	M. A. Bogan	MAB 6857	60	1118	285
BLCA	08/09/01	Hopi chipmunk	M. A. Bogan	MAB 6854	60	1115	285
BLCA	08/09/01	long-legged myotis	M. A. Bogan	MAB 6856	60	1117	285
BLCA	08/09/01	brush mouse	M. A. Bogan	MAB 6855	60	1116	285
BLCA	08/10/01	Townsend's big-eared bat	E. W. Valdez	EWV 1382	60	1120	289
BLCA	08/10/01	yuma myotis	E. W. Valdez	EWV 1381	60	1119	289
CARE	02/10/01	bighorn sheep	E. W. Valdez	EWV 1326	215	6041	274
CARE	06/14/01	western small-footed myotis	E. W. Valdez	EWV 1304	215	6042	274
CARE	06/15/01	California myotis	E. W. Valdez	EWV 1305	215	6044	274
CARE	06/15/01	California myotis	E. W. Valdez	EWV 1306	215	6045	274
CARE	06/15/01	California myotis	E. W. Valdez	EWV 1307	215	6046	274
CARE	06/15/01	western small-footed myotis	E. W. Valdez	EWV 1308	215	6047	274
CARE	06/15/01	Townsend's big-eared bat	E. W. Valdez	EWV 1309	215	6048	274

Appendix D. Continued.

Park code	Date	Species common name	Collector name	Collector number	NPS accession number	NPS catalog number	MSB accession no.
CARE	06/15/01	elk	E. W. Valdez	EWV 1310	215	6043	274
CARE	06/16/01	Long-eared myotis	E. W. Valdez	EWV 1311	215	6049	274
CARE	06/16/01	Long-eared myotis	E. W. Valdez	EWV 1312	215	6050	274
CARE	06/16/01	long-legged myotis	E. W. Valdez	EWV 1313	215	6051	274
CARE	06/16/01	long-legged myotis	E. W. Valdez	EWV 1314	215	6052	274
CARE	06/16/01	silver-haired bat	E. W. Valdez	EWV 1315	215	6053	274
CARE	06/17/01	California myotis	E. W. Valdez	EWV 1316	215	6054	274
CARE	06/17/01	California myotis	E. W. Valdez	EWV 1317	215	6055	274
CARE	06/18/01	Ord's kangaroo rat	E. W. Valdez	EWV 1323	215	6061	274
CARE	06/18/01	great basin pocket mouse	E. W. Valdez	EWV 1321	215	6059	274
CARE	06/18/01	great basin pocket mouse	E. W. Valdez	EWV 1320	215	6058	274
CARE	06/18/01	great basin pocket mouse	E. W. Valdez	EWV 1322	215	6060	274
CARE	06/18/01	yuma myotis	E. W. Valdez	EWV 1318	215	6056	274
CARE	06/18/01	big brown bat	E. W. Valdez	EWV 1319	215	6057	274
CARE	06/19/01	Long-eared myotis	E. W. Valdez	EWV 1324	215	6062	274
CARE	06/19/01	deer mouse	E. W. Valdez	EWV 1325	215	6063	274
CARE	07/10/01	red-spotted toad	E. W. Valdez	EWV 1334	215	6064	281
CARE	07/10/01	desert woodrat	E. W. Valdez	EWV 1333	215	6065	281
CARE	07/11/01	yuma myotis	E. W. Valdez	EWV 1341	215	6072	281
CARE	07/11/01	yuma myotis	E. W. Valdez	EWV 1342	215	6073	281
CARE	07/11/01	Hopi chipmunk	E. W. Valdez	EWV 1335	215	6066	281
CARE	07/11/01	Hopi chipmunk	E. W. Valdez	EWV 1336	215	6067	281
CARE	07/11/01	Hopi chipmunk	E. W. Valdez	EWV 1337	215	6068	281
CARE	07/11/01	piñon mouse	E. W. Valdez	EWV 1338	215	6069	281
CARE	07/11/01	piñon mouse	E. W. Valdez	EWV 1339	215	6070	281

Appendix D. Continued.

Park code	Date	Species common name	Collector name	Collector number	NPS accession number	NPS catalog number	MSB accession no.
CARE	07/11/01	desert woodrat	E. W. Valdez	EWV 1340	215	6071	281
CARE	07/12/01	Allen's big-eared bat	E. W. Valdez	EWV 1343	215	6074	281
CARE	07/12/01	Brazilian free-tailed bat	E. W. Valdez	EWV 1344	215	6075	281
CARE	07/12/01	big free-tailed bat	E. W. Valdez	EWV 1345	215	6076	281
CARE	07/12/01	peromyscus species	E. W. Valdez	EWV 1346	215	6077	281
CARE	07/12/01	peromyscus species	E. W. Valdez	EWV 1347	215	6078	281
CARE	07/12/01	deer mouse	E. W. Valdez	EWV 1348	215	6079	281
CARE	07/12/01	peromyscus species	E. W. Valdez	EWV 1349	215	6080	281
CARE	07/12/01	peromyscus species	E. W. Valdez	EWV 1350	215	6081	281
CARE	07/12/01	peromyscus species	E. W. Valdez	EWV 1351	215	6082	281
CARE	07/07/02	California myotis	E.W. Valdez	EWV 1433	227	6107	311
CARE	07/07/02	California myotis	E.W. Valdez	EWV 1432	227	6106	311
CARE	07/07/02	Western small-footed myotis	E.W. Valdez	EWV 1434	227	6108	311
CEBR	07/11/01	montane shrew	E. W. Valdez	EWV 1352	23	1132	281
CEBR	07/14/01	long-legged myotis	E. W. Valdez	EWV 1354	23	1133	281
CEBR	07/14/01	deer mouse	E. W. Valdez	EWV 1355	23	1134	281
CEBR	07/15/01	Northern pocket gopher	E. W. Valdez	EWV 1359	23	1139	281
CEBR	07/15/01	Northern pocket gopher	E. W. Valdez	EWV 1360	23	1140	281
CEBR	07/15/01	Northern pocket gopher	E. W. Valdez	EWV 1361	23	1141	281
CEBR	07/15/01	little brown bat	E. W. Valdez	EWV 1357	23	1136	281
CEBR	07/15/01	little brown bat	E. W. Valdez	EWV 1358	23	1137	281
CEBR	07/15/01	deer mouse	E. W. Valdez	EWV 1356	23	1138	281
CEBR	07/15/01	least chipmunk	C. A. Ramotnik	CAR 4874	23	1142	284
CEBR	07/15/01	Uinta chipmunk	C. A. Ramotnik	CAR 4873	23	1143	284
CEBR	07/15/01	deer mouse	E. W. Valdez	EWV 1362	23	1144	281

Appendix D. Continued.

Park code	Date	Species common name	Collector name	Collector number	NPS accession number	NPS catalog number	MSB accession no.
CEBR	07/15/01	Northern pocket gopher	E. W. Valdez	EWV 1353	23	1135	281
CEBR	07/16/01	montane vole	C. A. Ramotnik	CAR 4876	23	1145	284
CEBR	07/16/01	deer mouse	C. A. Ramotnik	CAR 4875	23	1146	284
CEBR	07/18/01	montane shrew	C. A. Ramotnik	CAR 4877	23	1147	284
CEBR	09/06/01	Uinta chipmunk	C. A. Ramotnik	CAR 4878	23	1148	293
CEBR	09/06/01	deer mouse	C. A. Ramotnik	CAR 4879	23	1149	293
CEBR	09/06/01	deer mouse	C. A. Ramotnik	CAR 4880	23	1150	293
CEBR	09/07/01	deer mouse	C. A. Ramotnik	CAR 4881	23	1151	293
CEBR	09/07/01	deer mouse	C. A. Ramotnik	CAR 4882	23	1152	293
CEBR	09/07/01	deer mouse	C. A. Ramotnik	CAR 4883	23	1153	293
CEBR	09/07/01	deer mouse	C. A. Ramotnik	CAR 4884	23	1154	293
CEBR	09/08/01	Uinta chipmunk	C. A. Ramotnik	CAR 4885	23	1155	293
CEBR	09/08/01	Uinta chipmunk	C. A. Ramotnik	CAR 4886	23	1156	293
CEBR	09/08/01	long-tailed vole	C. A. Ramotnik	CAR 4890	23	1157	293
CEBR	09/08/01	deer mouse	C. A. Ramotnik	CAR 4887	23	1158	293
CEBR	09/08/01	deer mouse	C. A. Ramotnik	CAR 4888	23	1159	293
CEBR	09/08/01	deer mouse	C. A. Ramotnik	CAR 4889	23	1160	293
CEBR	09/09/01	montane shrew	C. A. Ramotnik	CAR 4891	23	1161	293
CEBR	09/10/01	deer mouse	C. A. Ramotnik	CAR 4892	23	1162	293
CEBR	09/10/01	deer mouse	C. A. Ramotnik	CAR 4893	23	1163	293
CEBR	09/11/01	deer mouse	C. A. Ramotnik	CAR 4894	23	1164	293
CEBR	09/11/01	deer mouse	C. A. Ramotnik	CAR 4895	23	1165	293
CEBR	09/11/01	deer mouse	C. A. Ramotnik	CAR 4896	23	1166	293
CEBR	09/11/01	deer mouse	C. A. Ramotnik	CAR 4897	23	1167	293
CEBR	06/29/02	Deer mouse	C. A. Ramotnik	CAR 4862	25	1317	309

Appendix D. Continued.

Park code	Date	Species common name	Collector name	Collector number	NPS accession number	NPS catalog number	MSB accession no.
CEBR	06/29/02	Deer mouse	C. A. Ramotnik	CAR 4863	25	1318	309
CEBR	06/29/02	Deer mouse	C. A. Ramotnik	CAR 4864	25	1319	309
CEBR	06/29/02	Uinta chipmunk	C. A. Ramotnik	CAR 4865	25	1320	309
CEBR	06/29/02	Long-tailed vole	C. A. Ramotnik	CAR 4866	25	1321	309
CEBR	06/30/02	Western jumping mouse	C. A. Ramotnik	CAR 4867	25	1322	309
CEBR	07/02/02	Deer mouse	M. A. Bogan	MAB 6899	25	1323	309
CEBR	07/02/02	Golden-mantled ground squirrel	M. A. Bogan	MAB 6898	25	1324	309
CEBR	07/03/02	silver-haired bat	E. W. Valdez	EWV 1428	25	1326	311
CEBR	07/03/02	piñon mouse	C. A. Ramotnik	CAR 4869	25	1325	309
CEBR	07/04/02	long-eared myotis	E. W. Valdez	EWV 1429	25	1327	311
CEBR	07/04/02	Northern pocket gopher	C.A. Ramotnik	CAR 4868	25	1328	309
CEBR	07/05/02	Western small-footed myotis	E. W. Valdez	EWV 1430	25	1329	311
CEBR	07/06/02	Western small-footed myotis	E. W. Valdez	EWV 1431	25	1330	311
CURE	07/16/01	least chipmunk	C. A. Ramotnik	CAR 4799	154	16473	282
CURE	07/16/01	bushy-tailed woodrat	C. A. Ramotnik	CAR 4802	154	16475	282
CURE	07/16/01	deer mouse	C. A. Ramotnik	CAR 4801	154	16474	282
CURE	07/16/01	masked shrew	C. A. Ramotnik	CAR 4800	154	16472	282
CURE	07/16/01	long-tailed vole	C. A. Ramotnik	CAR 4805	154	16477	282
CURE	07/16/01	long-tailed vole	C. A. Ramotnik	CAR 4804	154	16476	282
CURE	07/17/01	bushy-tailed woodrat	D. T. Chavez	DTC 25	154	16483	282
CURE	07/17/01	long-tailed vole	D. T. Chavez	DTC 26	154	16484	282
CURE	07/17/01	western jumping mouse	D. T. Chavez	DTC 27	154	16485	282
CURE	07/17/01	western jumping mouse	D. T. Chavez	DTC 24	154	16482	282
CURE	07/17/01	little brown bat	D. T. Chavez	DTC 20	154	16478	282
CURE	07/17/01	little brown bat	D. T. Chavez	DTC 21	154	16479	282

Appendix D. Continued.

Park code	Date	Species common name	Collector name	Collector number	NPS accession number	NPS catalog number	MSB accession no.
CURE	07/17/01	deer mouse	D. T. Chavez	DTC 23	154	16481	282
CURE	07/17/01	Northern pocket gopher	D. T. Chavez	DTC 22	154	16480	282
CURE	07/18/01	long-tailed vole	T. R. Mollhagen	TRM 2685	154	16487	282
CURE	07/18/01	long-tailed vole	T. R. Mollhagen	TRM 2886	154	16488	282
CURE	07/18/01	northern water shrew	T. R. Mollhagen	TRM 2683	154	16486	282
CURE	07/18/01	northern water shrew	T. R. Mollhagen	TRM 2684	154	16489	282
CURE	07/18/01	Colorado chipmunk	T. R. Mollhagen	TRM 2687	154	16490	282
CURE	07/19/01	rock squirrel	C. A. Ramotnik	CAR 4806	154	16491	282
CURE	07/23/01	brush mouse	M. A. Bogan	MAB 6844	154	16495	282
CURE	07/23/01	brush mouse	M. A. Bogan	MAB 6845	154	16496	282
CURE	08/13/01	little brown bat	E. W. Valdez	EWV 1389	154	16497	289
CURE	08/11/02	long-eared myotis	E.W. Valdez	EWV 1450	156	16478	320
CURE	08/11/02	long-legged myotis	E.W. Valdez	EWV 1451	156	16479	320
CURE	08/11/02	long-legged myotis	E.W. Valdez	EWV 1452	156	16480	320
CURE-near	07/16/01	golden-mantled ground squirrel	C. A. Ramotnik	CAR 4803	N/A (USFS)	N/A (USFS)	282
CURE-near	07/19/01	Colorado chipmunk	C. A. Ramotnik	CAR 4807	N/A (USFS)	N/A (USFS)	282
CURE-near	07/19/01	red squirrel	M. A. Bogan	MAB 6843	N/A (USFS)	N/A (USFS)	282
CURE-near	07/19/01	montane vole	M. A. Bogan	MAB 6840	N/A (USFS)	N/A (USFS)	282
CURE-near	07/19/01	meadow vole	M. A. Bogan	MAB 6841	N/A (USFS)	N/A (USFS)	282
CURE-near	07/19/01	western jumping mouse	M. A. Bogan	MAB 6842	N/A (USFS)	N/A (USFS)	282
CURE-near	07/20/01	little brown bat	C. A. Ramotnik	CAR 4810	N/A (USFS)	N/A (USFS)	282
CURE-near	07/20/01	masked shrew	C. A. Ramotnik	CAR 4809	N/A (USFS)	N/A (USFS)	282
CURE-near	07/20/01	masked shrew	C. A. Ramotnik	CAR 4808	N/A (USFS)	N/A (USFS)	282
CURE-near	08/11/01	little brown bat	E. W. Valdez	EWV 1386	N/A (USFS)	N/A (USFS)	282
CURE-near	08/11/01	little brown bat	E. W. Valdez	EWV 1383	N/A (USFS)	N/A (USFS)	282

Appendix D. Continued.

Park code	Date	Species common name	Collector name	Collector number	NPS accession number	NPS catalog number	MSB accession no.
CURE-near	08/11/01	little brown bat	E. W. Valdez	EWV 1384	N/A (USFS)	N/A (USFS)	282
CURE-near	08/11/01	little brown bat	E. W. Valdez	EWV 1385	N/A (USFS)	N/A (USFS)	282
CURE-near	08/11/01	long-legged myotis	E. W. Valdez	EWV 1387	N/A (USFS)	N/A (USFS)	282
CURE-near	08/11/01	long-legged myotis	E. W. Valdez	EWV 1388	N/A (USFS)	N/A (USFS)	282
FOBU	08/09/01	ermine	C. A. Ramotnik	CAR 4898	204	6556	291
FOBU	08/15/01	Northern pocket gopher	C. A. Ramotnik	CAR 4899	204	6557	291
FOBU	06/23/02	little brown bat	E. W. Valdez	EWV 1417	267	9798	310
FOBU	06/23/02	long-legged myotis	E. W. Valdez	EWV 1419	267	9800	310
FOBU	06/23/02	little brown bat	E. W. Valdez	EWV 1418	267	9799	310
FOBU	06/23/02	long-eared myotis	E. W. Valdez	EWV 1416	267	9797	310
FOBU	06/24/02	little brown bat	E. W. Valdez	EWV 1421	267	9802	310
FOBU	06/24/02	Yuma myotis	E. W. Valdez	EWV 1422	267	9803	310
FOBU	06/24/02	little brown bat	E. W. Valdez	EWV 1423	267	9804	310
FOBU	06/24/02	long-eared myotis	E. W. Valdez	EWV 1420	267	9801	310
FOBU	06/24/02	long-legged myotis	E. W. Valdez	EWV 1424	267	9805	310
FOBU	06/24/02	silver-haired bat	E. W. Valdez	EWV 1425	267	9806	310
FOBU	06/24/02	silver-haired bat	E. W. Valdez	EWV 1426	267	9807	310
FOBU	06/25/02	Western small-footed myotis	E. W. Valdez	EWV 1427	267	9808	310
FOBU	07/16/02	Deer mouse	T. R. Mollhagen	TRM 2706	267	9811	312
FOBU	07/16/02	Deer mouse	T. R. Mollhagen	TRM 2707	267	9812	312
FOBU	07/16/02	northern grasshopper mouse	T. R. Mollhagen	TRM 2708	267	9813	312
FOBU	07/16/02	Montane vole	T. R. Mollhagen	TRM 2709	267	9814	312
FOBU	07/16/02	Montane vole	T. R. Mollhagen	TRM 2710	267	9815	312
FOBU	07/16/02	Montane vole	T. R. Mollhagen	TRM 2711	267	9816	312
FOBU	07/16/02	Montane vole	T. R. Mollhagen	TRM 2712	267	9817	312

Appendix D. Continued.

Park code	Date	Species common name	Collector name	Collector number	NPS accession number	NPS catalog number	MSB accession no.
FOBU	07/16/02	montane shrew	T. R. Mollhagen	TRM 2704	267	9809	312
FOBU	07/16/02	Least chipmunk	T. R. Mollhagen	TRM 2705	267	9810	312
FOBU	07/17/02	Least chipmunk	T. R. Mollhagen	TRM 2714	267	9819	312
FOBU	07/17/02	Montane vole	T. R. Mollhagen	TRM 2716	267	9821	312
FOBU	07/17/02	Long-tailed vole	T. R. Mollhagen	TRM 2715	267	9820	312
FOBU	07/17/02	montane shrew	T. R. Mollhagen	TRM 2713	267	9818	312
FOBU	07/19/02	Montane vole	M. A. Bogan	MAB 6906	267	9826	312
FOBU	07/19/02	Long-tailed vole	M. A. Bogan	MAB 6913	267	9827	312
FOBU	07/19/02	Long-tailed vole	M. A. Bogan	MAB 6914	267	9828	312
FOBU	07/19/02	Long-tailed vole	M. A. Bogan	MAB 6915	267	9829	312
FOBU	07/19/02	Bushy-tailed woodrat	M. A. Bogan	MAB 6905	267	9825	312
FOBU	07/19/02	Yellow pine chipmunk	M. A. Bogan	MAB 6907	267	9822	312
FOBU	07/19/02	Yellow pine chipmunk	M. A. Bogan	MAB 6908	267	9823	312
FOBU	07/19/02	Yellow pine chipmunk	M. A. Bogan	MAB 6909	267	9824	312
FOBU	07/19/02	Western jumping mouse	M. A. Bogan	MAB 6912	267	9832	312
FOBU	07/19/02	Western jumping mouse	M. A. Bogan	MAB 6911	267	9831	312
FOBU	07/19/02	Long-tailed vole	M. A. Bogan	MAB 6910	267	9830	312
GOSP	07/29/01	montane vole	C. A. Ramotnik	CAR 4900	116	548	291
GOSP	07/31/01	big brown bat	C. A. Ramotnik	CAR 4902	116	550	291
GOSP	07/31/01	yellow-bellied marmot	C. A. Ramotnik	CAR 4901	116	549	291
GOSP	07/31/01	long-tailed vole	C. A. Ramotnik	CAR 4905	116	553	291
GOSP	07/31/01	montane vole	C. A. Ramotnik	CAR 4904	116	552	291
GOSP	07/31/01	long-tailed weasel	C. A. Ramotnik	CAR 4907	116	555	291
GOSP	07/31/01	deer mouse	C. A. Ramotnik	CAR 4909	116	557	291
GOSP	07/31/01	cottontail	C. A. Ramotnik	CAR 4906	116	554	291

Appendix D. Continued.

Park code	Date	Species common name	Collector name	Collector number	NPS accession number	NPS catalog number	MSB accession no.
GOSP	07/31/01	Northern pocket gopher	C. A. Ramotnik	CAR 4908	116	556	291
GOSP	08/01/01	western pipistrelle	C. A. Ramotnik	CAR 4903	116	551	291
GOSP	08/01/01	deer mouse	C. A. Ramotnik	CAR 4911	116	559	291
GOSP	08/01/01	badger	C. A. Ramotnik	CAR 4910	116	558	291
GOSP	06/20/02	vole sp.	E.W. Valdez	EWV 1446	116	560	310
GOSP	06/21/02	Western small-footed myotis	E. W. Valdez	EWV 1415	116	561	310
GOSP	07/20/02	Deer mouse	M. A. Bogan	MAB 6916	116	562	312
GOSP	07/21/02	Great Basin pocket mouse	M. A. Bogan	MAB 6917	116	563	312
GOSP	07/22/02	Western Harvest Mouse	M. A. Bogan	MAB 6918	116	564	312
GOSP	07/22/02	Western Harvest Mouse	M. A. Bogan	MAB 6919	116	565	312
GOSP	07/22/02	Deer mouse	M. A. Bogan	MAB 6920	116	566	312
GOSP	07/23/02	Great Basin pocket mouse	T. R. Mollhagen	TRM 2717	116	567	312
GOSP	07/23/02	ord's kangaroo rat	T. R. Mollhagen	TRM 2718	116	568	312
HOVE	09/23/01	Hopi chipmunk	C. A. Ramotnik	CAR 4912	100	18383	295
HOVE	09/23/01	piñon mouse	C. A. Ramotnik	CAR 4913	100	18384	295
HOVE	09/23/01	least chipmunk	C. A. Ramotnik	CAR 4914	100	18385	295
HOVE	09/23/01	deer mouse	C. A. Ramotnik	CAR 4915	100	18386	295
HOVE	09/23/01	piñon mouse	C. A. Ramotnik	CAR 4916	100	18387	295
HOVE	09/23/01	piñon mouse	C. A. Ramotnik	CAR 4917	100	18388	295
HOVE	09/24/01	Mexican woodrat	C. A. Ramotnik	CAR 4918	100	18389	295
HOVE	09/24/01	brush mouse	C. A. Ramotnik	CAR 4919	100	18390	295
HOVE	09/24/01	canyon mouse	C. A. Ramotnik	CAR 4920	100	18391	295
HOVE	09/24/01	piñon mouse	C. A. Ramotnik	CAR 4921	100	18392	295
HOVE	09/24/01	piñon mouse	C. A. Ramotnik	CAR 4922	100	18393	295
HOVE	09/24/01	white-throated woodrat	C. A. Ramotnik	CAR 4923	100	18394	295

Appendix D. Continued.

Park code	Date	Species common name	Collector name	Collector number	NPS accession number	NPS catalog number	MSB accession no.
HOVE	09/24/01	Mexican woodrat	C. A. Ramotnik	CAR 4924	100	18395	295
HOVE	09/24/01	brush mouse	C. A. Ramotnik	CAR 4925	100	18396	295
HOVE	09/24/01	piñon mouse	C. A. Ramotnik	CAR 4926	100	18397	295
HOVE	09/24/01	brush mouse	C. A. Ramotnik	CAR 4927	100	18398	295
HOVE	09/24/01	brush mouse	C. A. Ramotnik	CAR 4928	100	18399	295
HOVE	09/24/01	piñon mouse	C. A. Ramotnik	CAR 4929	100	18400	295
HOVE	09/24/01	white-throated woodrat	C. A. Ramotnik	CAR 4930	100	18401	295
HOVE	09/24/01	piñon mouse	C. A. Ramotnik	CAR 4931	100	18402	295
HOVE	09/24/01	piñon mouse	C. A. Ramotnik	CAR 4932	100	18403	295
HOVE	09/25/01	piñon mouse	C. A. Ramotnik	CAR 4934	100	18405	295
HOVE	09/25/01	western harvest mouse	C. A. Ramotnik	CAR 4935	100	18406	295
HOVE	09/25/01	brush mouse	C. A. Ramotnik	CAR 4933	100	18404	295
HOVE	06/07/02	California myotis	E.W. Valdez	EWV 1404	109	18421	306
HOVE	06/07/02	Western small-footed myotis	E.W. Valdez	EWV 1406	109	18423	306
HOVE	06/07/02	Western small-footed myotis	E.W. Valdez	EWV 1407	109	18424	306
HOVE	06/07/02	fringed myotis	E.W. Valdez	EWV 1408	109	18425	306
HOVE	06/07/02	California myotis	E.W. Valdez	EWV 1405	109	18422	306
HOVE	06/07/02	pallid bat	E.W. Valdez	EWV 1409	109	18426	306
HOVE	06/08/02	Western small-footed myotis	E.W. Valdez	EWV 1411	109	18428	306
HOVE	06/08/02	western pipistrelle	E.W. Valdez	EWV 1414	109	18431	306
HOVE	06/08/02	California myotis	E.W. Valdez	EWV 1410	109	18427	306
HOVE	06/08/02	long-eared myotis	E.W. Valdez	EWV 1412	109	18429	306
HOVE	06/08/02	fringed myotis	E.W. Valdez	EWV 1413	109	18430	306
HOVE	07/21/02	fringed myotis	E.W. Valdez	EWV 1444	109	18432	313
HOVE	07/21/02	fringed myotis	E.W. Valdez	EWV 1445	109	18433	313

Appendix D. Continued.

Park code	Date	Species common name	Collector name	Collector number	NPS accession number	NPS catalog number	MSB accession no.
HOVE	08/05/02	Silky pocket mouse	M.A. Bogan	MAB 6921	109	18434	319
HOVE	08/05/02	Silky pocket mouse	M.A. Bogan	MAB 6923	109	18436	319
HOVE	08/05/02	piñon mouse	M.A. Bogan	MAB 6924	109	18437	319
HOVE	08/05/02	Mexican woodrat	M.A. Bogan	MAB 6925	109	18438	319
HOVE	08/05/02	Silky pocket mouse	M.A. Bogan	MAB 6922	109	18435	319
HOVE	08/06/02	Hopi chipmunk	C.A. Ramotnik	CAR 4871	109	18439	319
HOVE	08/06/02	Bushy-tailed woodrat	C.A. Ramotnik	CAR 4872	109	18440	319
HOVE	08/08/02	Least chipmunk	M.A. Bogan	MAB 6926	109	18441	319
HOVE	08/08/02	Brush mouse	M.A. Bogan	MAB 6927	109	18442	319
HOVE	08/08/02	Brush mouse	M.A. Bogan	MAB 6928	109	18443	319
HOVE	08/08/02	piñon mouse	M.A. Bogan	MAB 6929	109	18444	319
PISP	07/16/01	western small-footed myotis	E. W. Valdez	EWV 1390	555	5201	283
PISP	07/16/01	western small-footed myotis	E. W. Valdez	EWV 1391	555	5202	283
PISP	07/16/01	western small-footed myotis	E. W. Valdez	EWV 1392	555	5203	283
PISP	07/16/01	western small-footed myotis	E. W. Valdez	EWV 1393	555	5204	283
PISP	07/16/01	long-legged myotis	E. W. Valdez	EWV 1394	555	5205	283
PISP	07/16/01	long-legged myotis	E. W. Valdez	EWV 1395	555	5206	283
PISP	08/01/01	botta's pocket gopher	C. A. Ramotnik	CAR 4941	555	5207	293
PISP	08/01/01	desert woodrat	C. A. Ramotnik	CAR 4936	555	5208	293
PISP	09/12/01	brush mouse	C. A. Ramotnik	CAR 4947	555	5218	293
PISP	09/12/01	long-tailed pocket mouse	C. A. Ramotnik	CAR 4937	555	5209	293
PISP	09/12/01	long-tailed pocket mouse	C. A. Ramotnik	CAR 4938	555	5210	293
PISP	09/12/01	canyon mouse	C. A. Ramotnik	CAR 4939	555	5211	293
PISP	09/12/01	piñon mouse	C. A. Ramotnik	CAR 4940	555	5212	293
PISP	09/12/01	deer mouse	C. A. Ramotnik	CAR 4942	555	5217	293

Appendix D. Continued.

Park code	Date	Species common name	Collector name	Collector number	NPS accession number	NPS catalog number	MSB accession no.
PISP	09/12/01	desert woodrat	C. A. Ramotnik	CAR 4943	555	5213	293
PISP	09/12/01	canyon mouse	C. A. Ramotnik	CAR 4944	555	5214	293
PISP	09/12/01	piñon mouse	C. A. Ramotnik	CAR 4945	555	5215	293
PISP	09/12/01	western harvest mouse	C. A. Ramotnik	CAR 4946	555	5216	293
PISP	06/26/02	Western Harvest Mouse	M. A. Bogan	MAB 6888	569	5152	309
PISP	06/26/02	cactus mouse	M. A. Bogan	MAB 6890	569	5154	309
PISP	06/26/02	cactus mouse	M. A. Bogan	MAB 6889	569	5153	309
PISP	06/26/02	Desert Woodrat	M. A. Bogan	MAB 6895	569	5159	309
PISP	06/26/02	Chisel-toothed kangaroo rat	M. A. Bogan	MAB 6893	569	5157	309
PISP	06/26/02	Long-tailed pocket mouse	M. A. Bogan	MAB 6892	569	5156	309
PISP	06/26/02	Deer mouse	M. A. Bogan	MAB 6894	569	5158	309
PISP	06/26/02	Long-tailed pocket mouse	M. A. Bogan	MAB 6891	569	5155	309
PISP	06/26/02	Deer mouse	C. A. Ramotnik	CAR 4857	569	5162	309
PISP	06/26/02	White-tailed antelope squirrel	C. A. Ramotnik	CAR 4855	569	5160	309
PISP	06/26/02	White-tailed antelope squirrel	C. A. Ramotnik	CAR 4856	569	5161	309
PISP	06/27/02	piñon mouse	C. A. Ramotnik	CAR 4858	569	5163	309
PISP	06/27/02	piñon mouse	C. A. Ramotnik	CAR 4859	569	5164	309
PISP	06/27/02	piñon mouse	C. A. Ramotnik	CAR 4860	569	5165	309
PISP	06/27/02	Desert Woodrat	C. A. Ramotnik	CAR 4861	569	5166	309
PISP	06/28/02	Cliff chipmunk	M. A. Bogan	MAB 6896	569	5167	309
PISP	06/28/02	Canyon mouse	M. A. Bogan	MAB 6897	569	5168	309
TICA	07/28/01	deer mouse	C. A. Ramotnik	CAR 4948	273	3129	291
TICA	07/12/02	Cliff chipmunk	M. A. Bogan	MAB 6900	280	3366	312
TICA	07/12/02	Cliff chipmunk	T. R. Mollhagen	TRM 2702	280	3369	312
TICA	07/12/02	Deer mouse	T. R. Mollhagen	TRM 2703	280	3370	312

Appendix D. Continued.

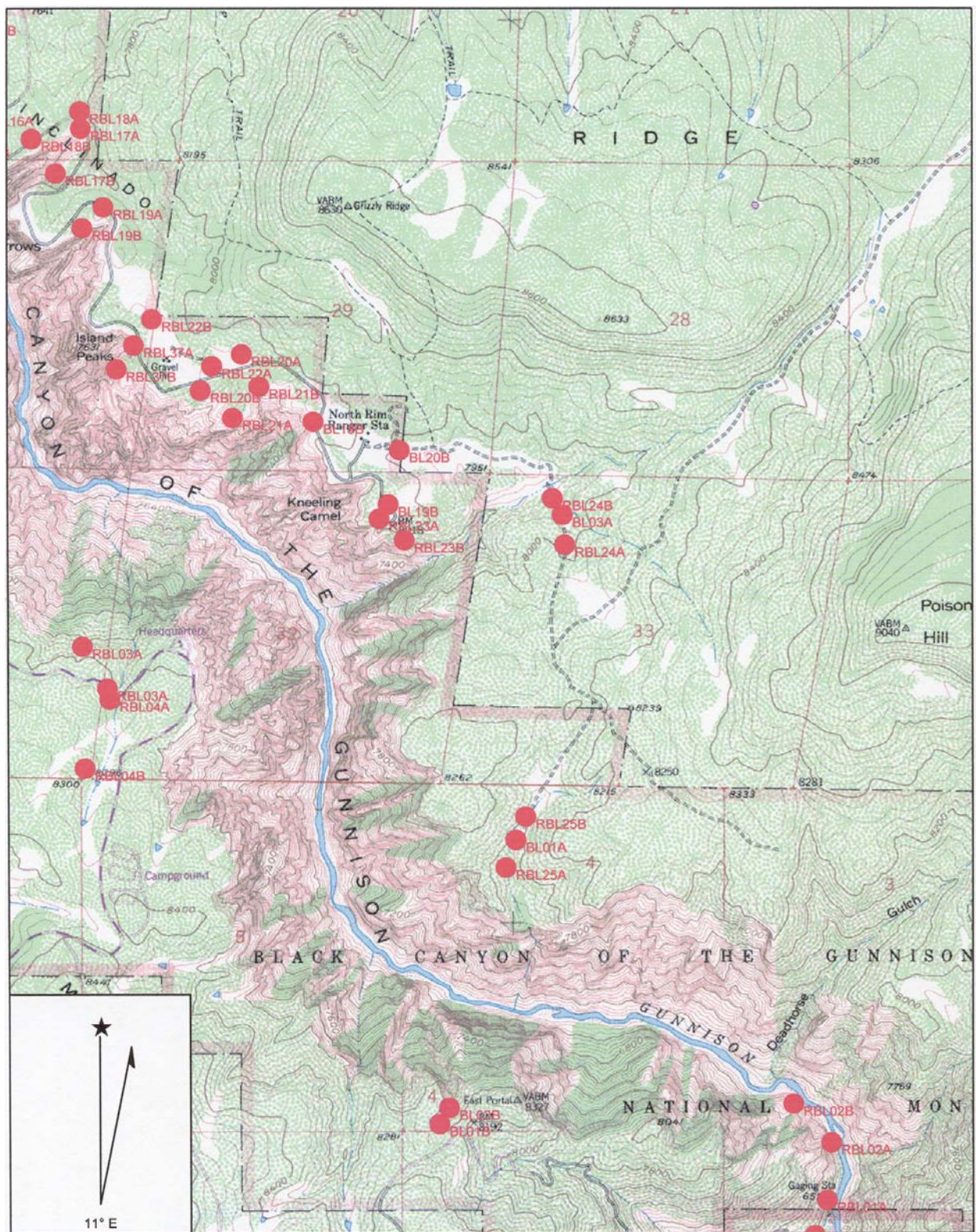
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TICA	07/12/02	rock squirrel	M. A. Bogan	MAB 6901	280	3367	312
TICA	07/12/02	rock squirrel	M. A. Bogan	MAB 6902	280	3368	312
TICA	07/13/02	Bushy-tailed woodrat	M. A. Bogan	MAB 6904	280	3372	312
TICA	07/13/02	Western harvest mouse	M. A. Bogan	MAB 6903	280	3371	312
TICA	08/05/02	long-eared myotis	E. W. Valdez	EWV 1447	280	3373	320
TICA	08/06/02	little brown bat	E. W. Valdez	EWV 1449	280	3375	320
TICA	08/06/02	long-eared myotis	E. W. Valdez	EWV 1448	280	3374	320
TICA-near	08/02/02	Least chipmunk	L. Harding	CAR 4950	N/A (USFS)	N/A (USFS)	321
TICA-near	08/02/02	Western jumping mouse	L. Harding	CAR 4949	N/A (USFS)	N/A (USFS)	321
TICA-near	08/02/02	Least chipmunk	L. Harding	CAR 4951	N/A (USFS)	N/A (USFS)	321
TICA-near	08/02/02	Deer mouse	L. Harding	CAR 4954	N/A (USFS)	N/A (USFS)	321
TICA-near	08/02/02	Deer mouse	L. Harding	CAR 4953	N/A (USFS)	N/A (USFS)	321
TICA-near	08/02/02	Deer mouse	L. Harding	CAR 4952	N/A (USFS)	N/A (USFS)	321

Appendix E. Maps (Maptech Terrain Navigator v. 4.05; Andover, MA) of 2001 and 2002 mammal study sites for BLCA, CARE, CEBR, CURE, FOBU, GOSP, HOVE, PISP and TICA.

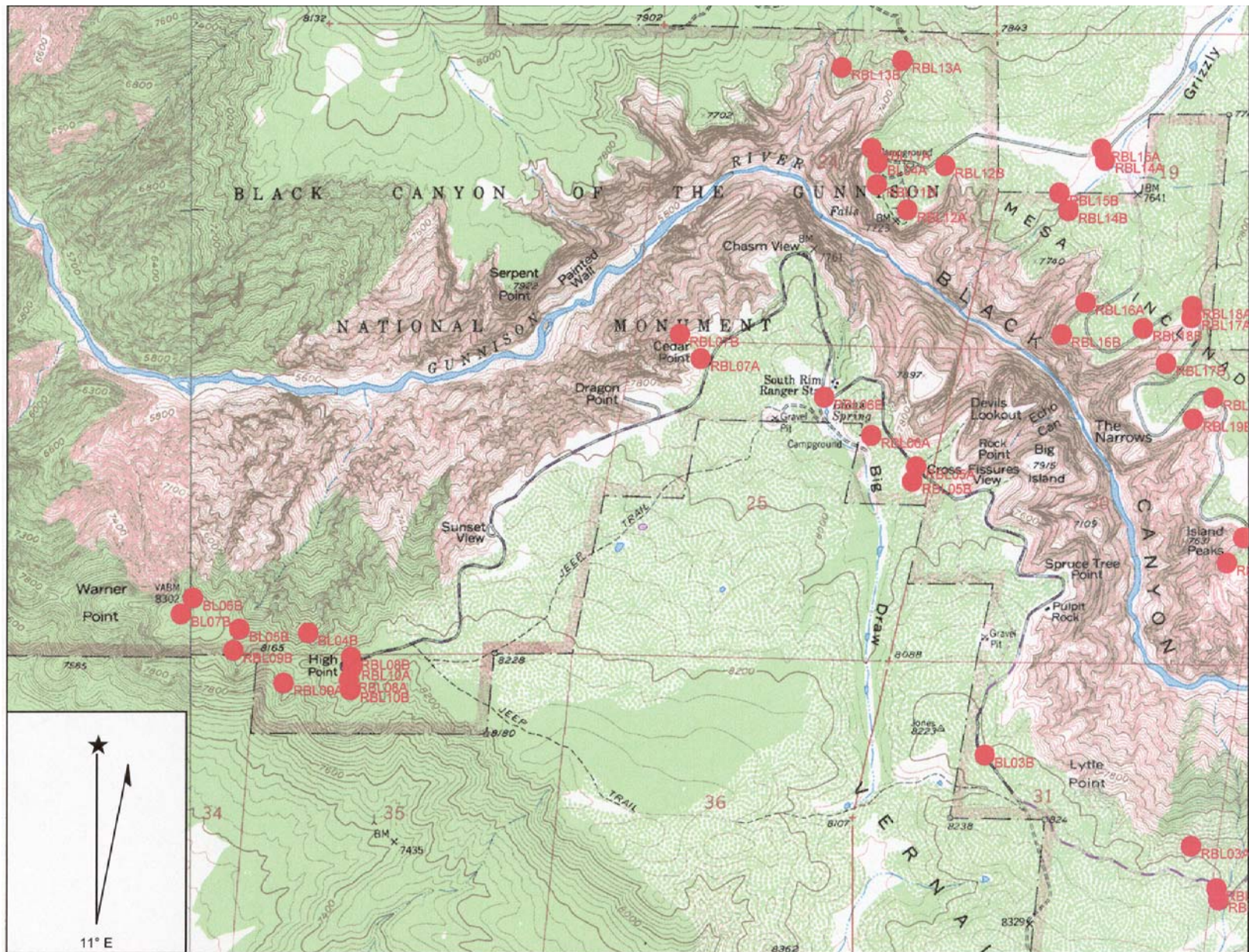
Black Canyon of the Gunnison National Park

2001 & 2002
Mammal Study Sites
and
Corresponding Waypoints

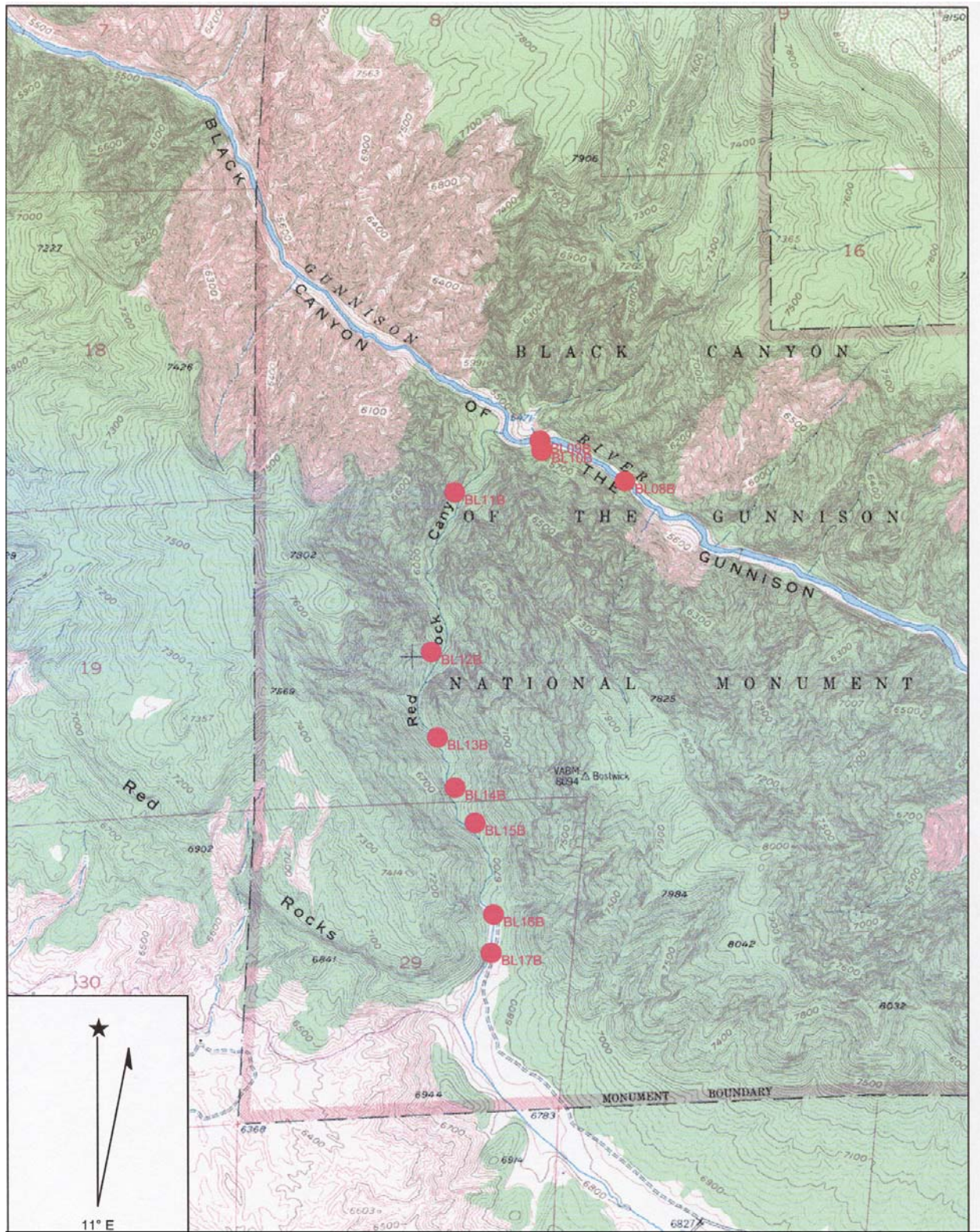
Maps 1-4



BLCA 1 of 4





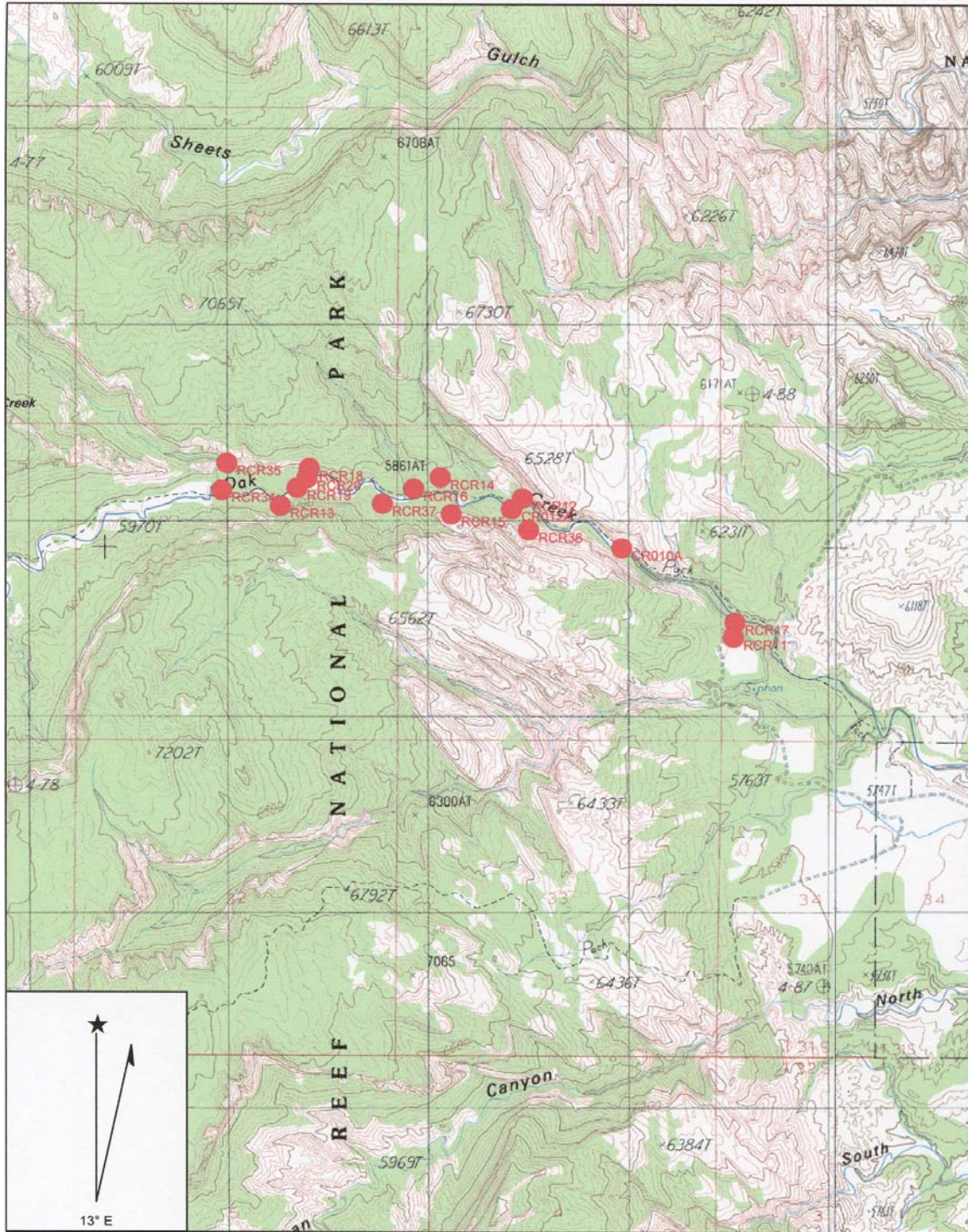


BLCA 4 of 4

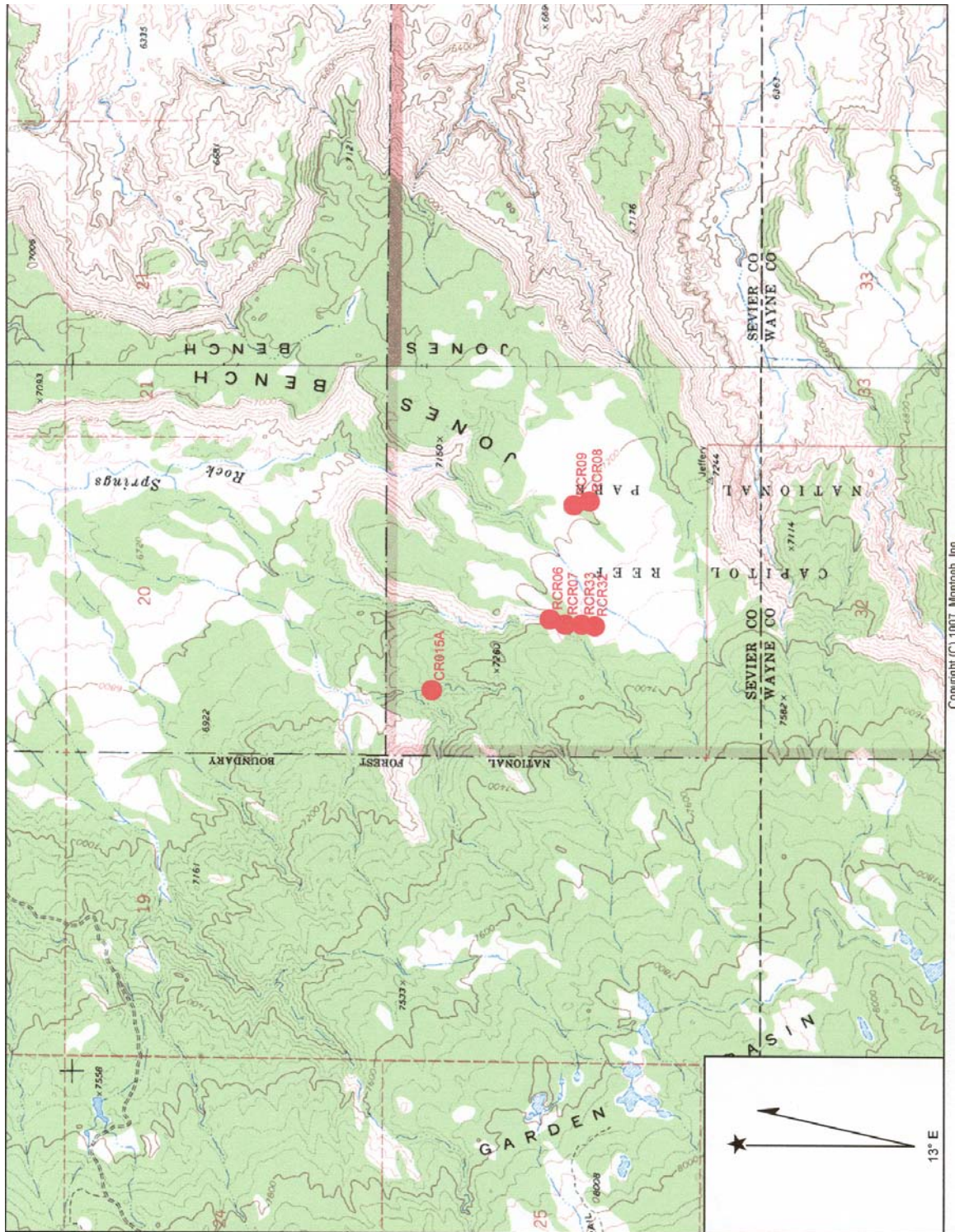
Capitol Reef National Park

2001 & 2002
Mammal Study Sites
and
Corresponding Waypoints

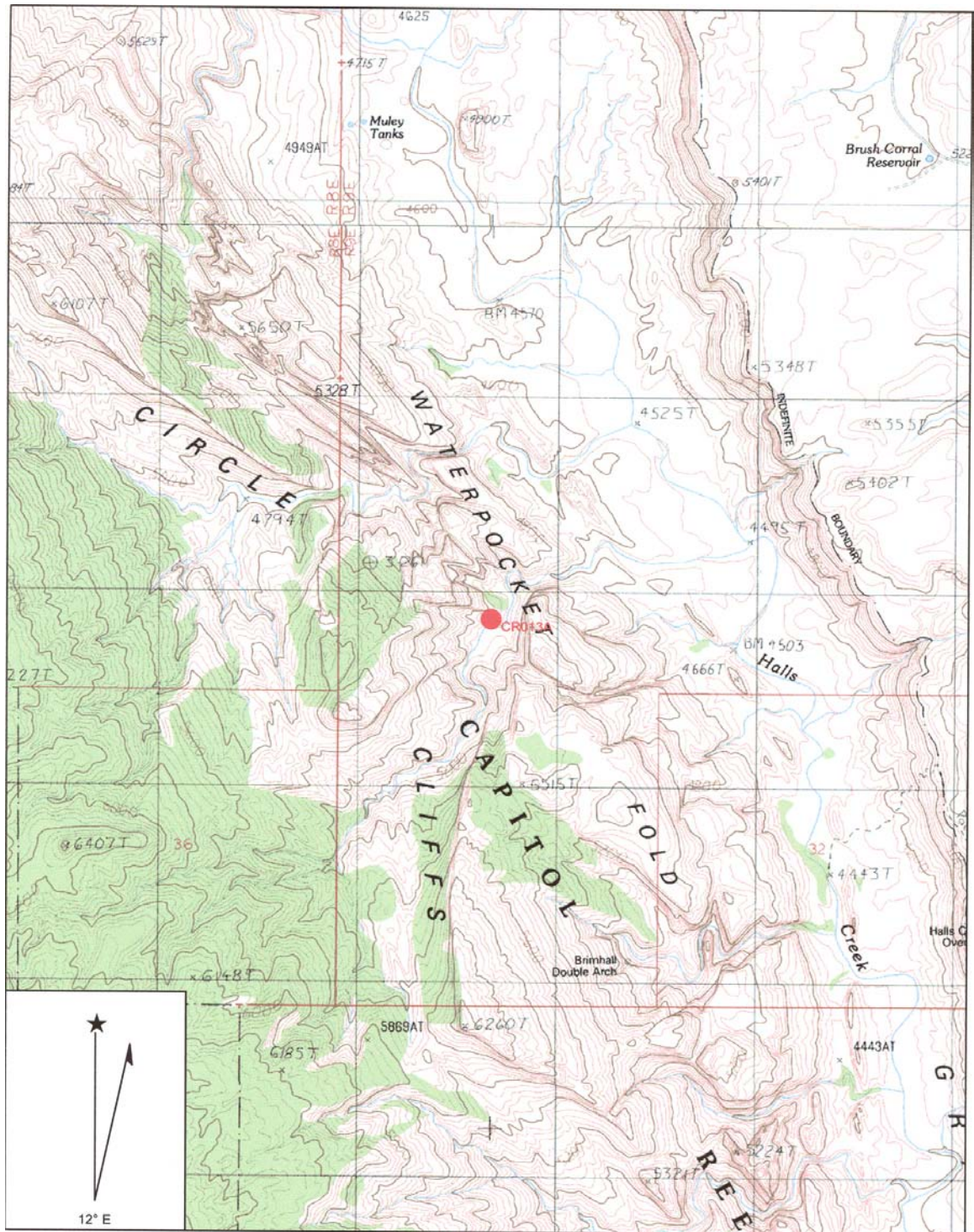
Maps 1-13



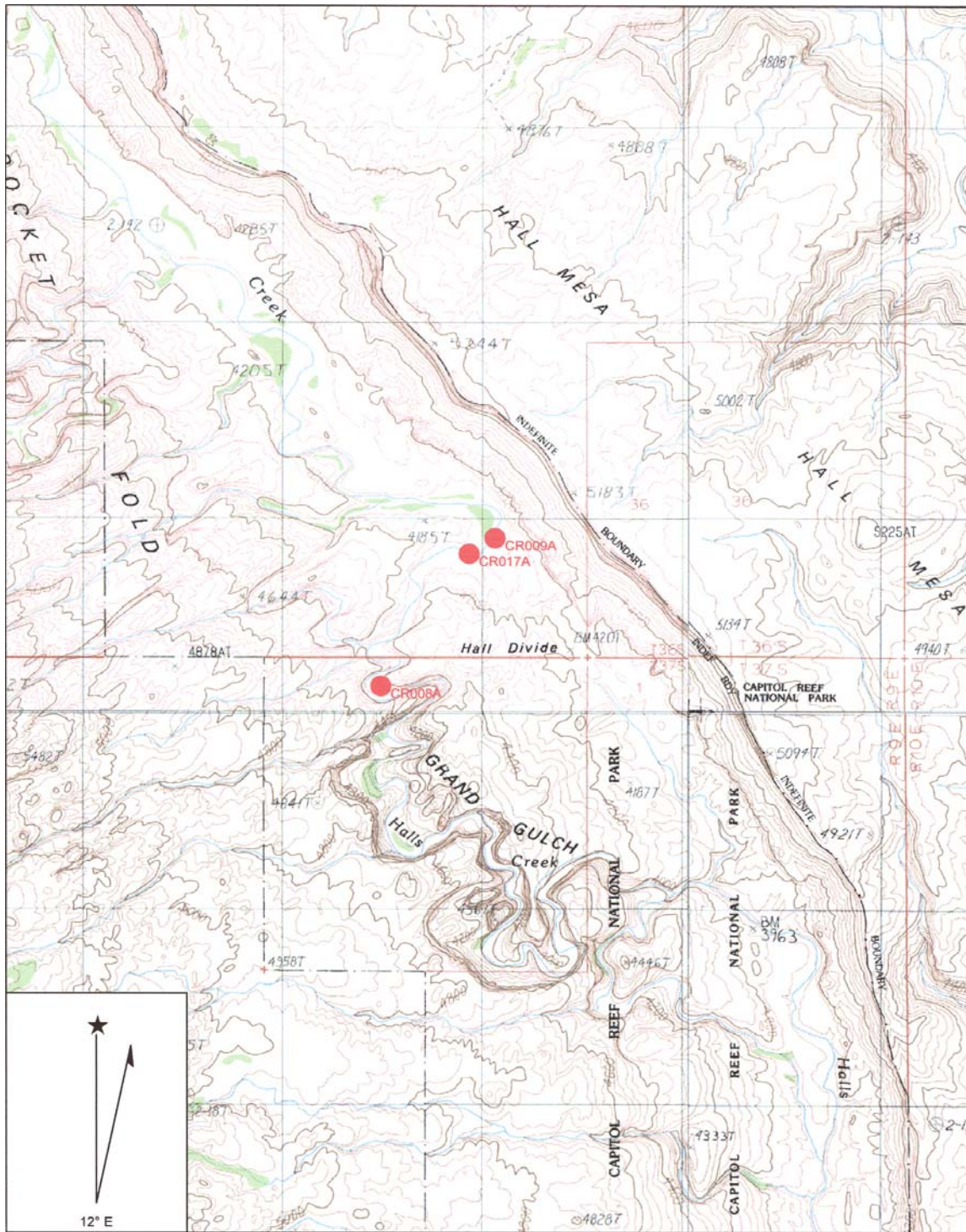
CARE 1 of 13



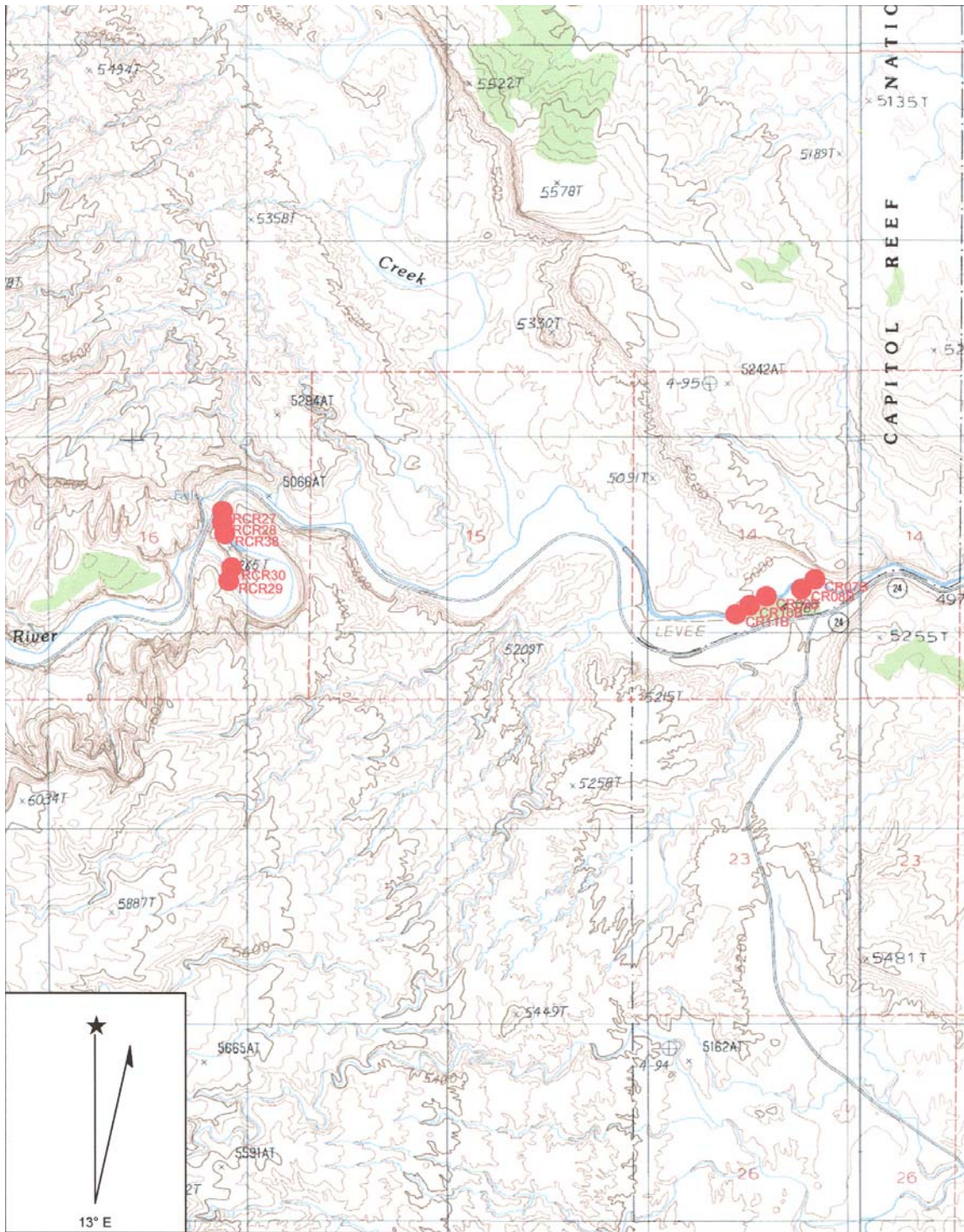
CARE 2 of 13



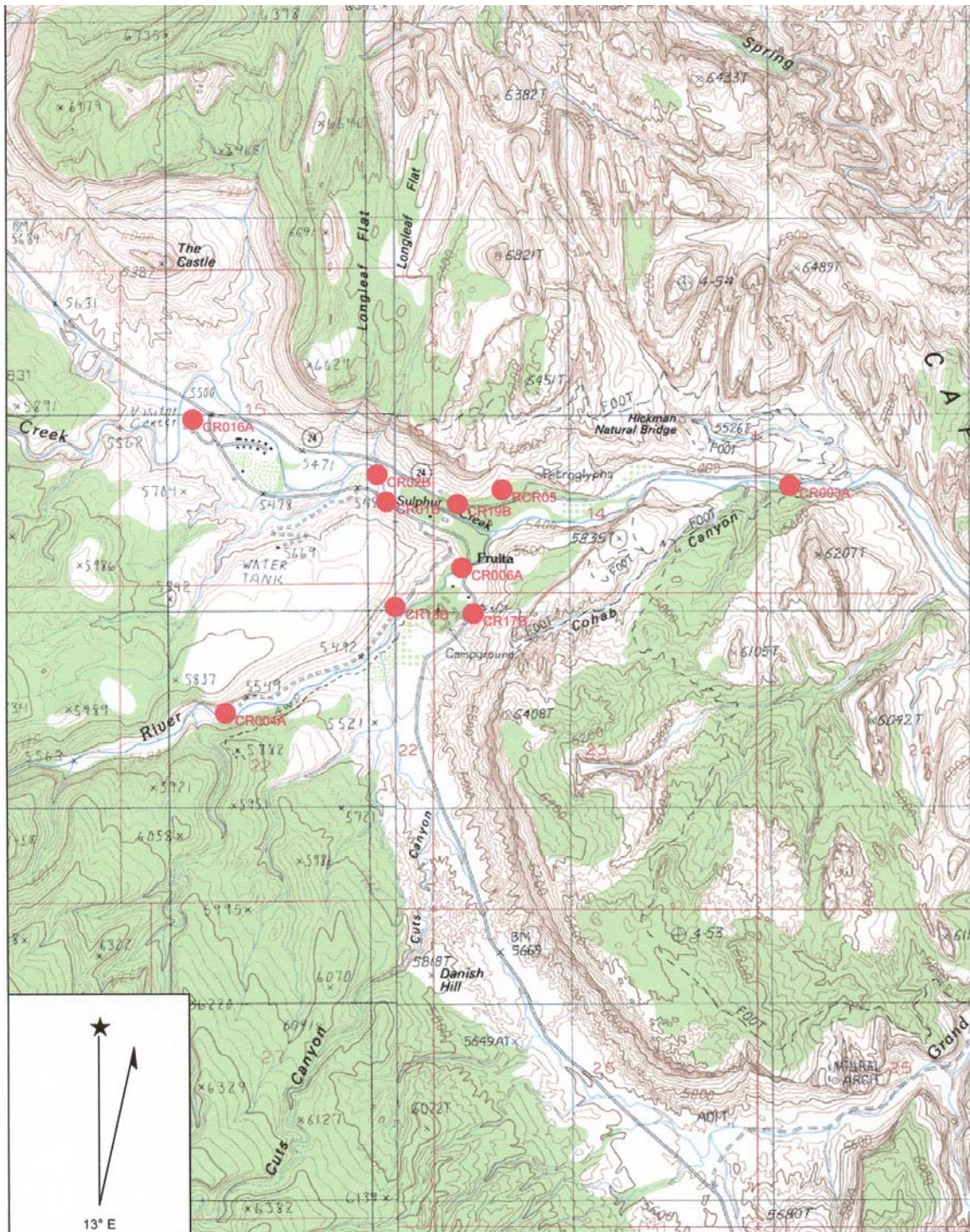
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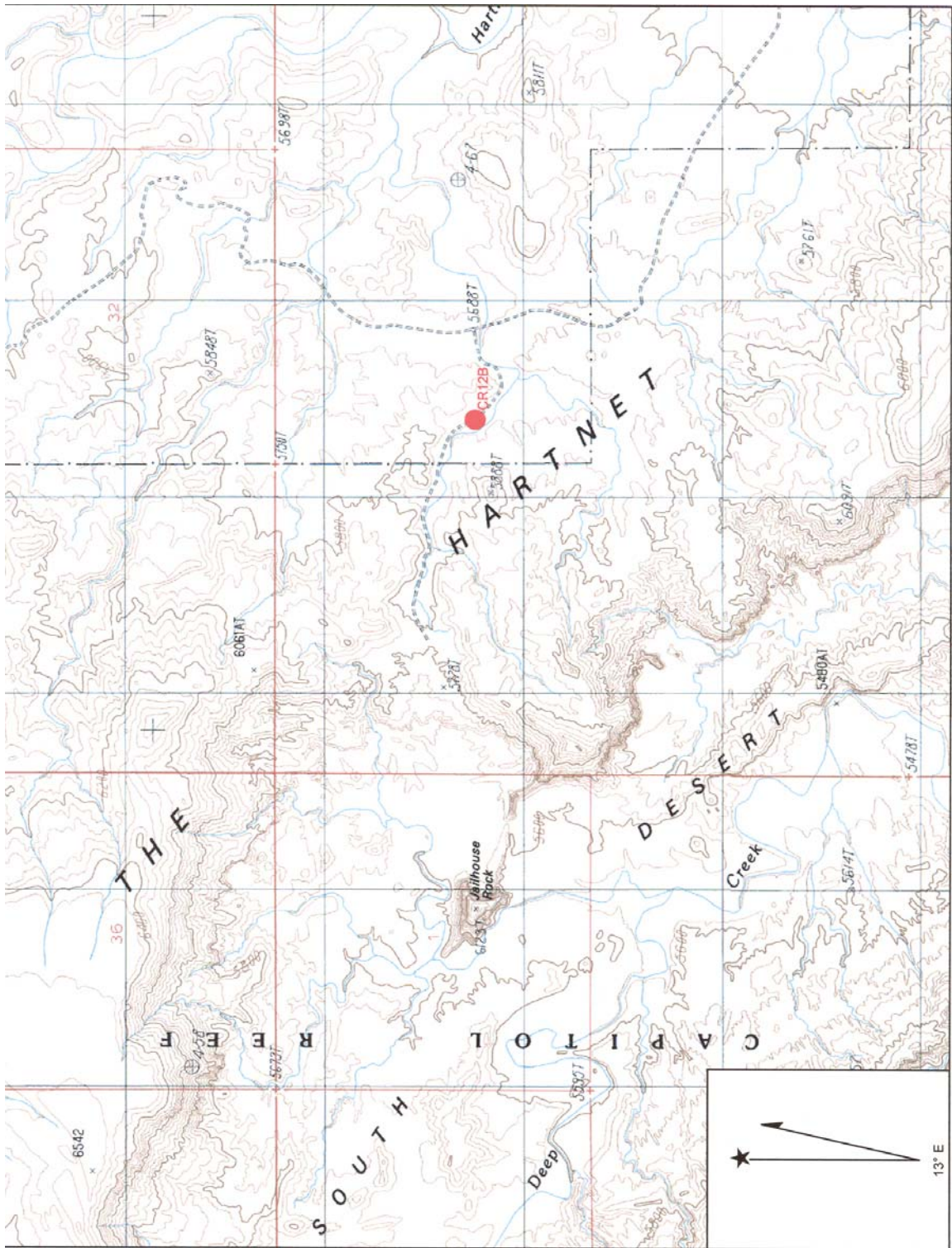


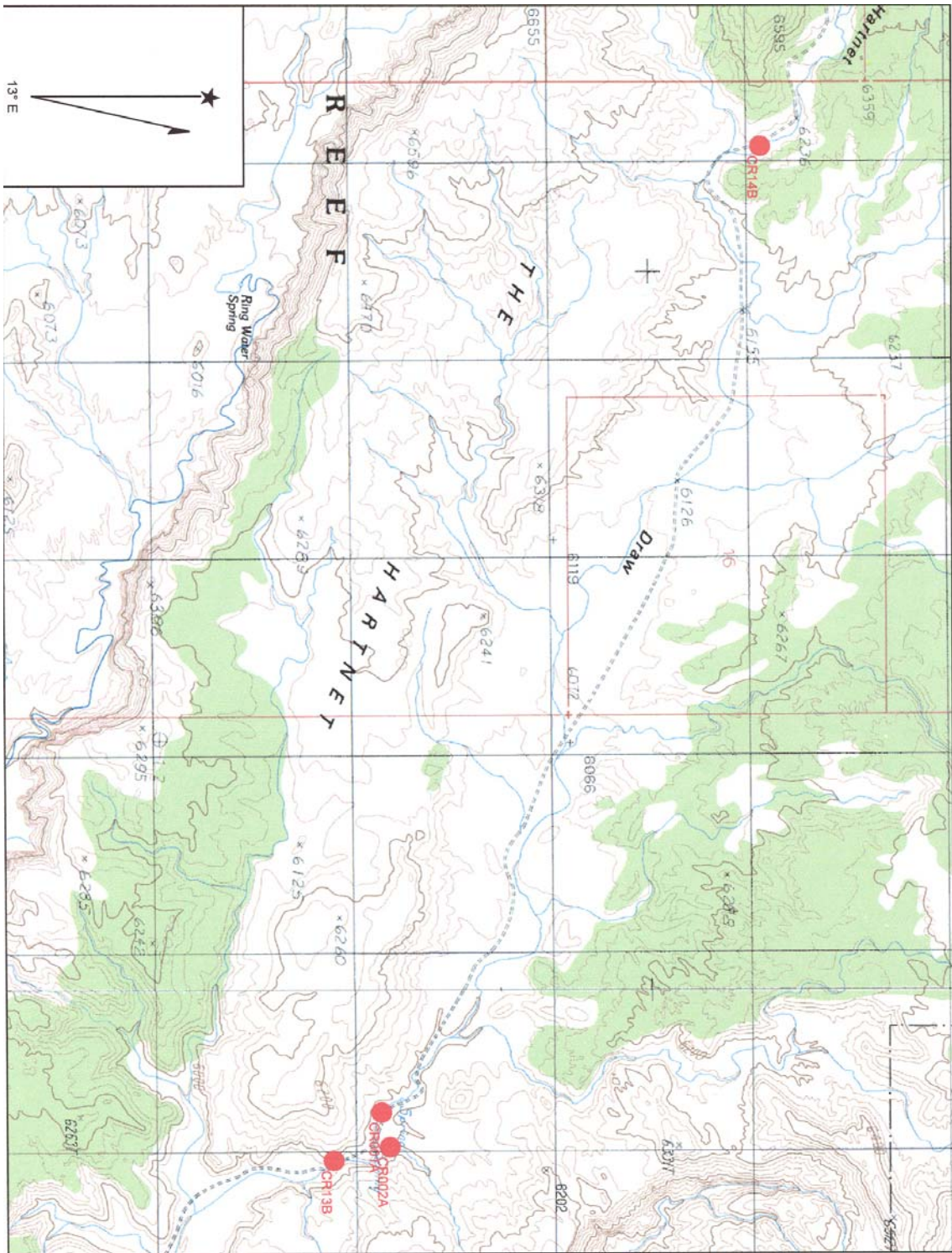
CARE 4 of 13

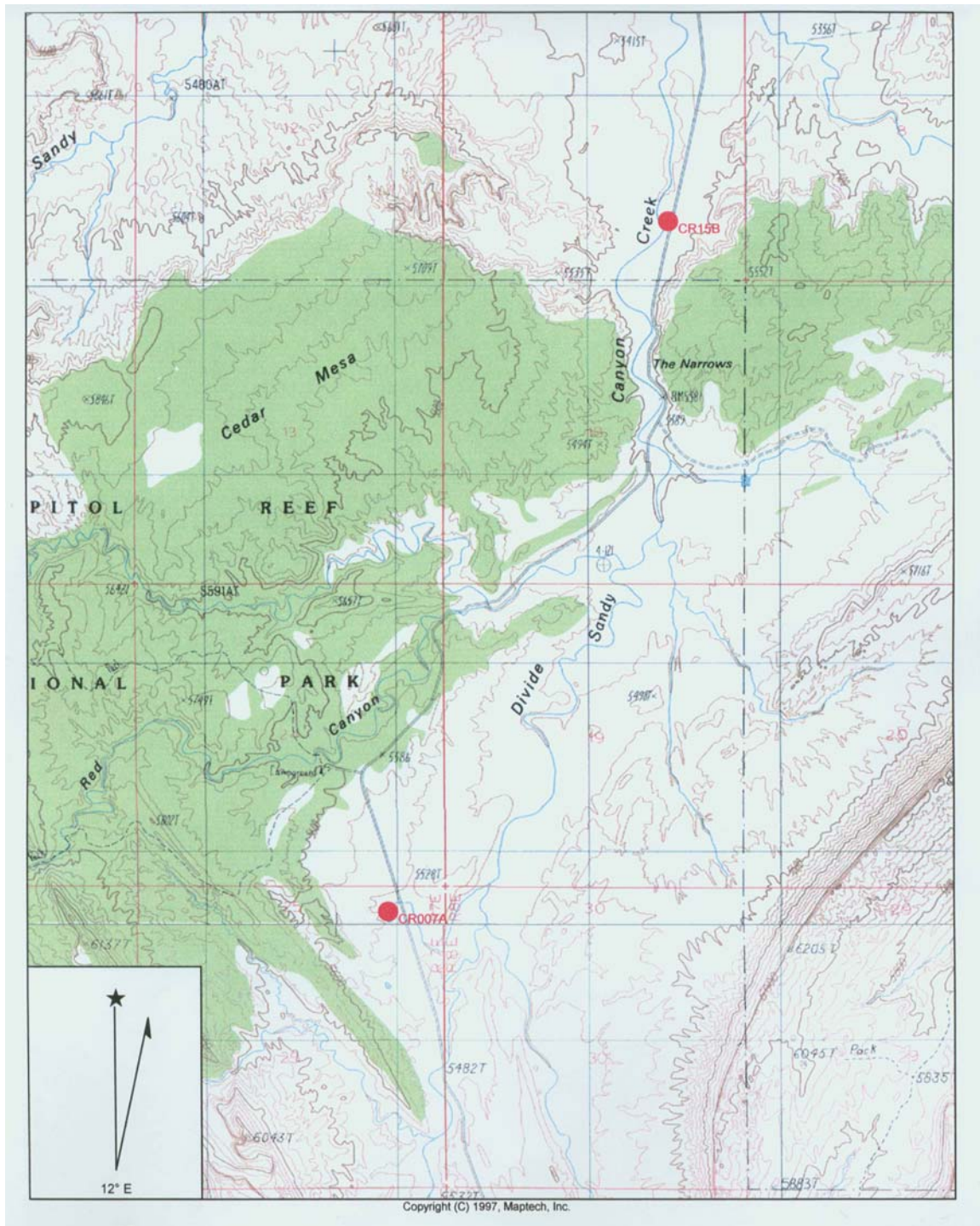


CARE 6 of 13





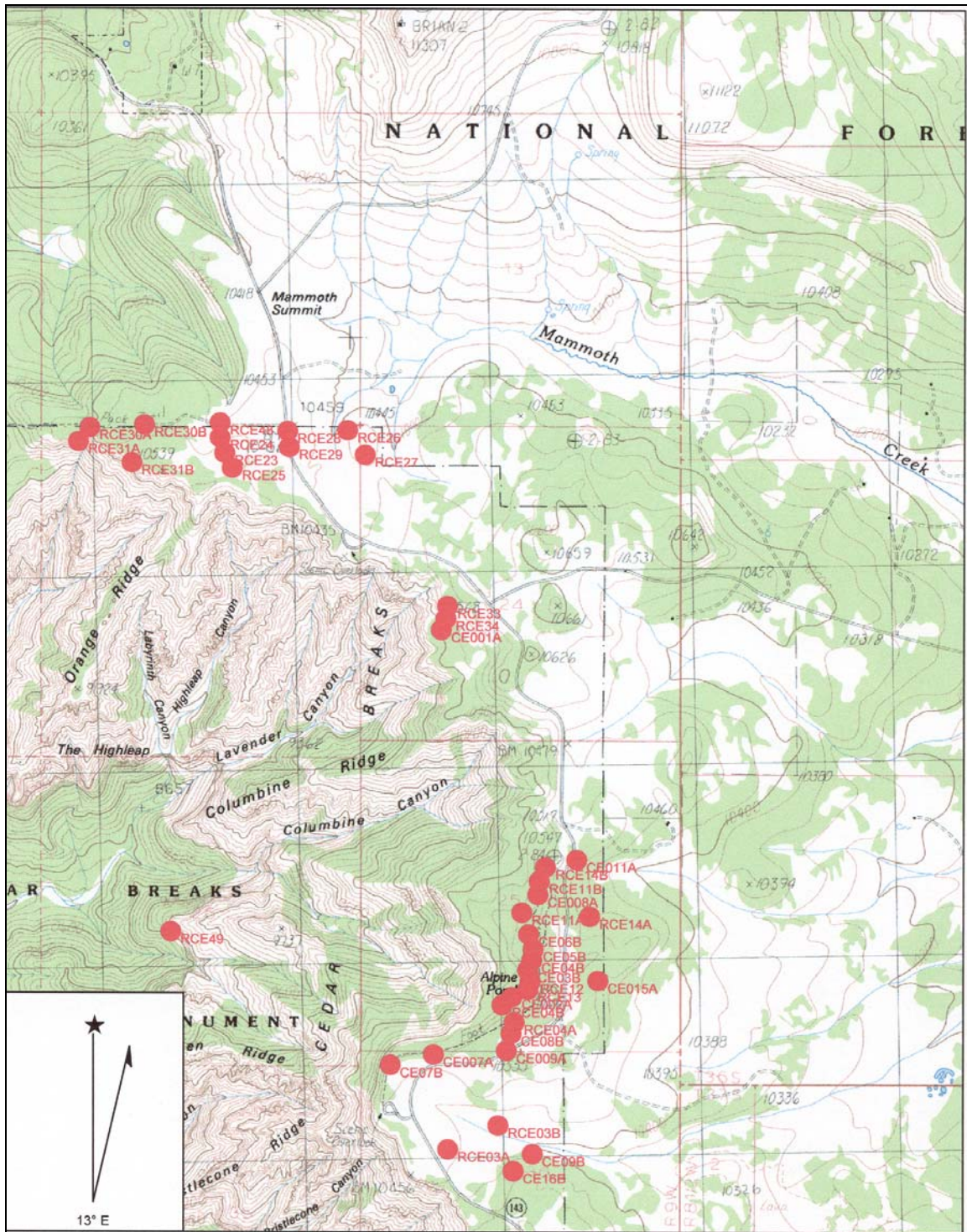




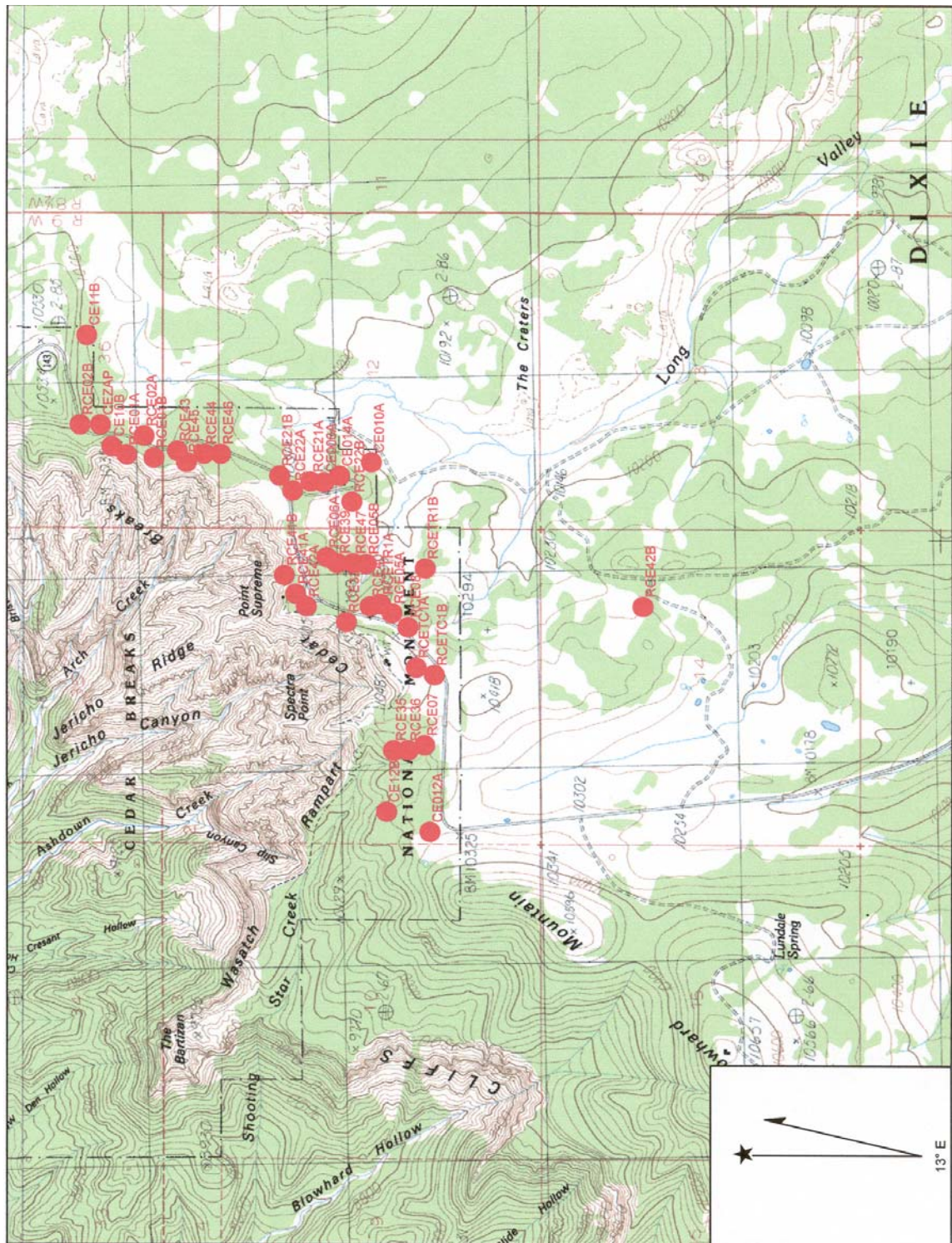
Cedar Breaks National Monument

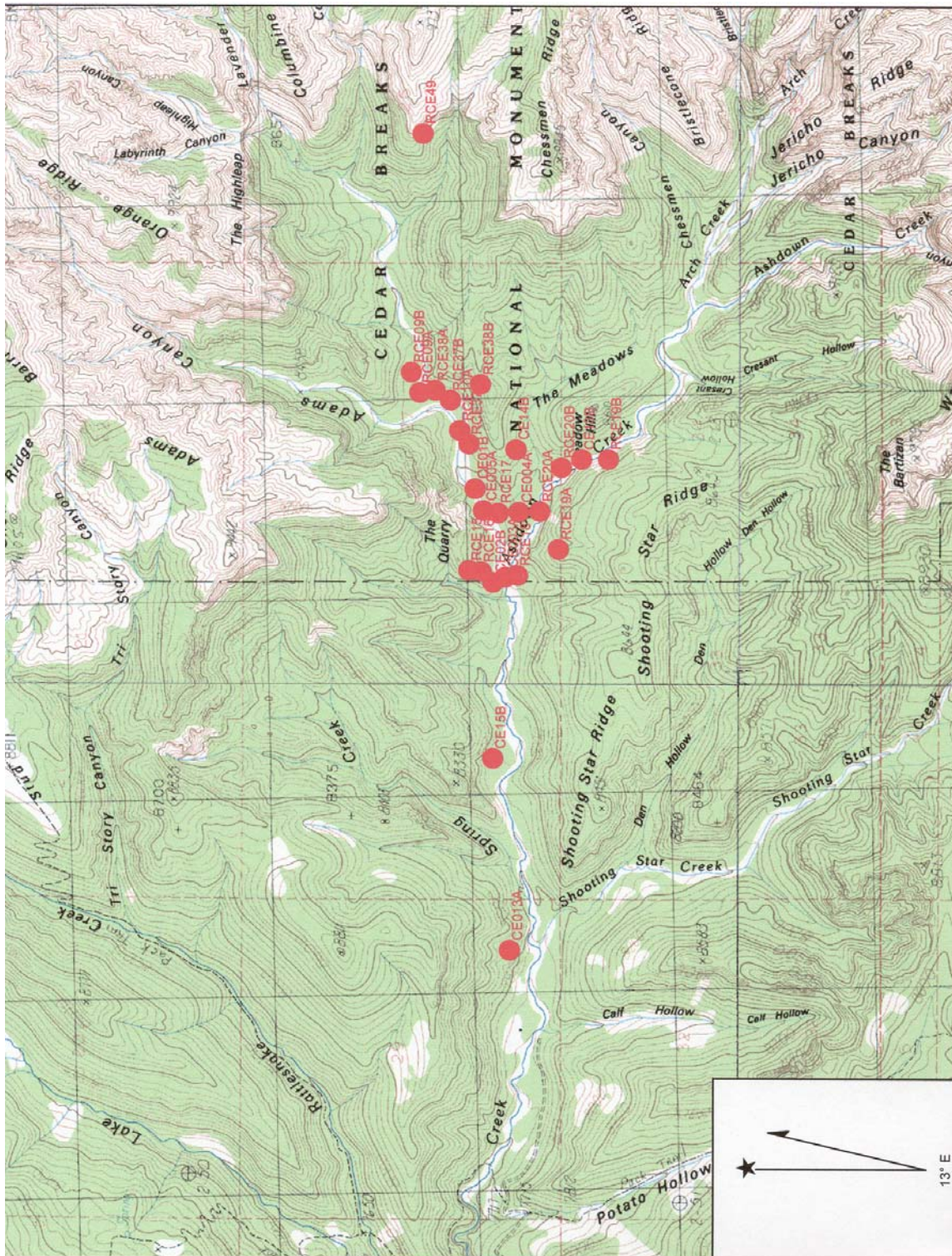
2001 & 2002
Mammal Study Sites
and
Corresponding Waypoints

Maps 1-3



CEBR 1 of 3

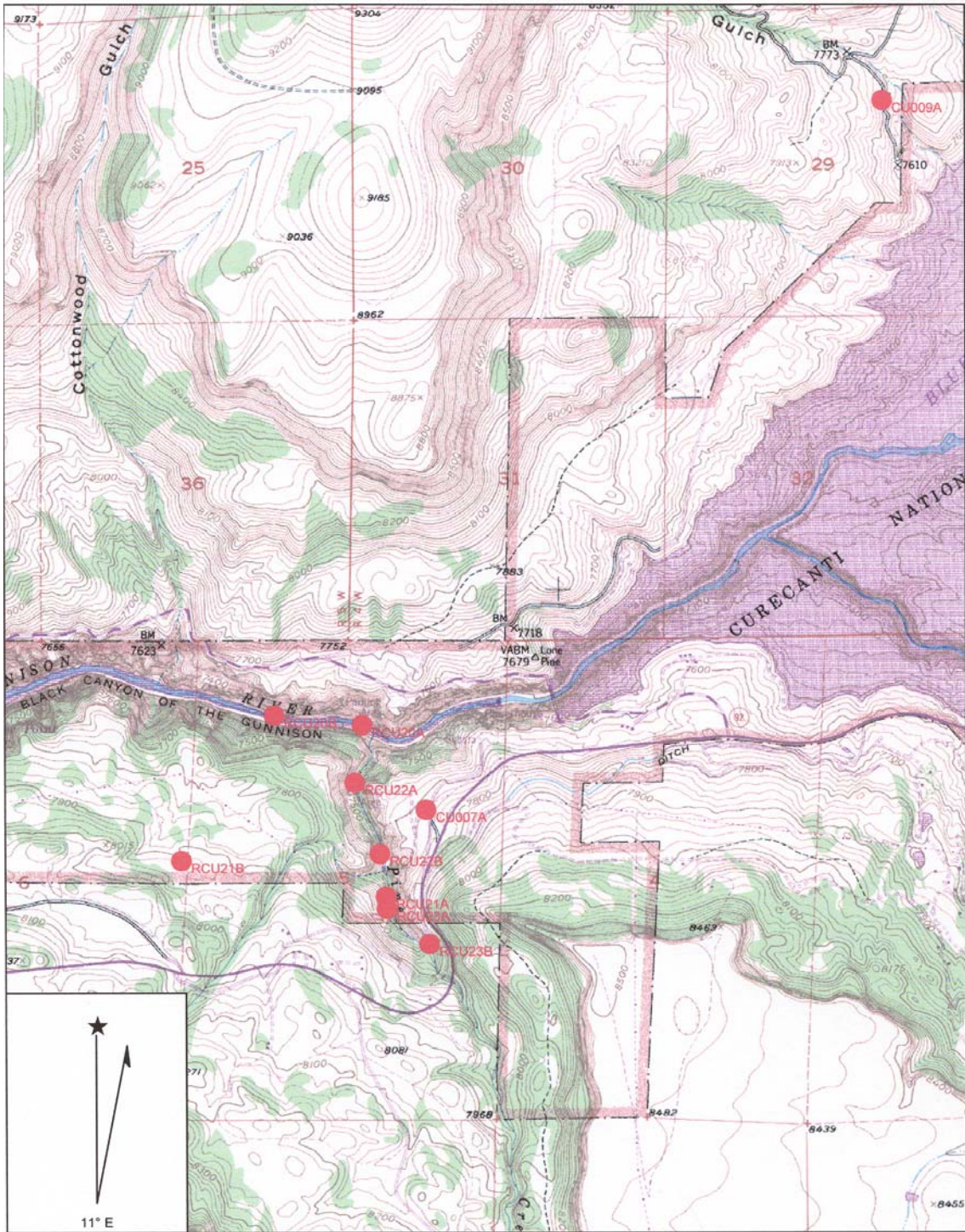




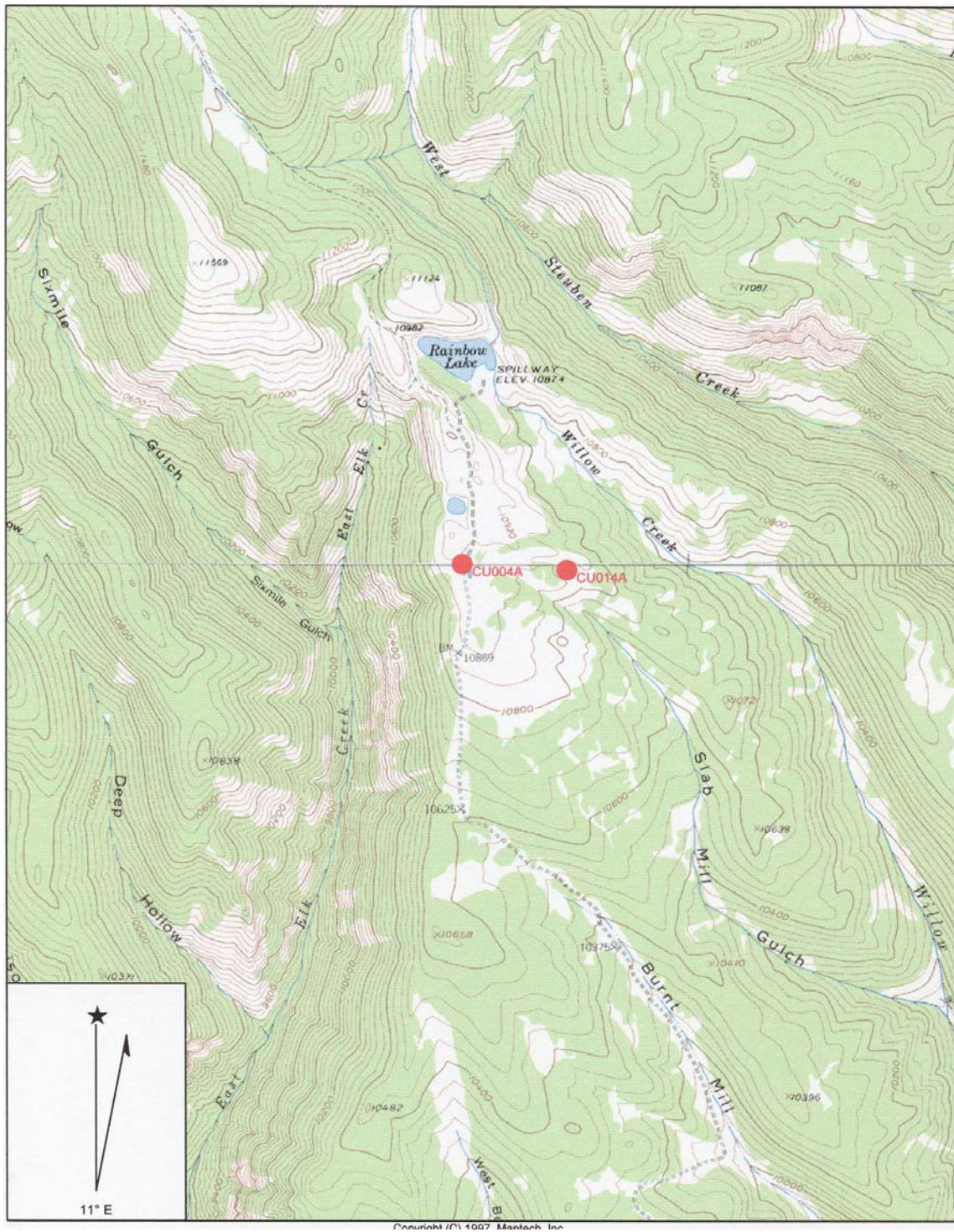
Curecanti National Recreation Area

2001 & 2002
Mammal Study Sites
and
Corresponding Waypoints

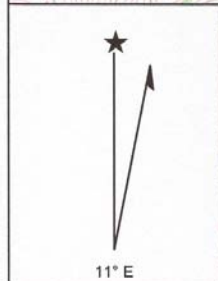
Maps 1-10



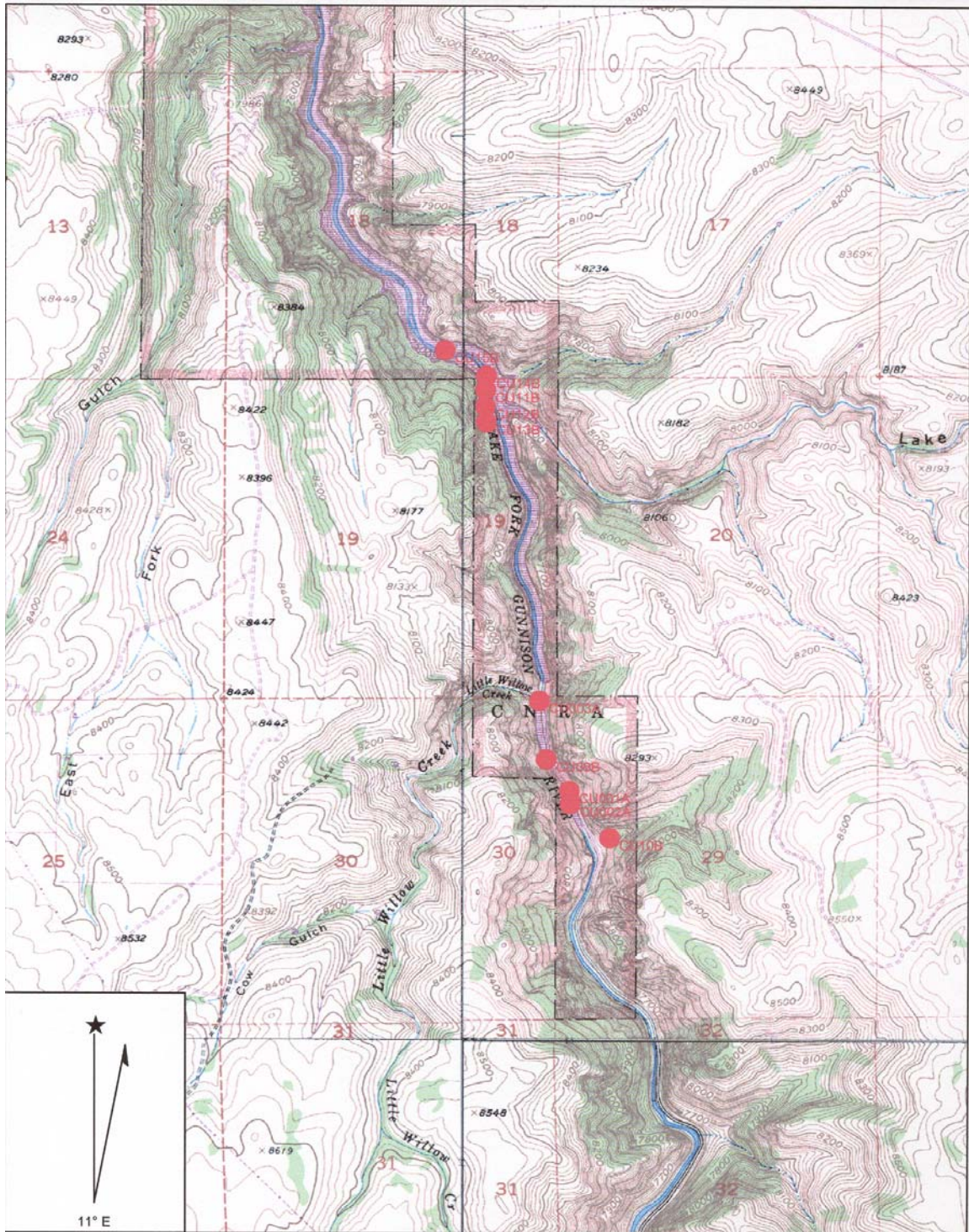
Map 1 of 10



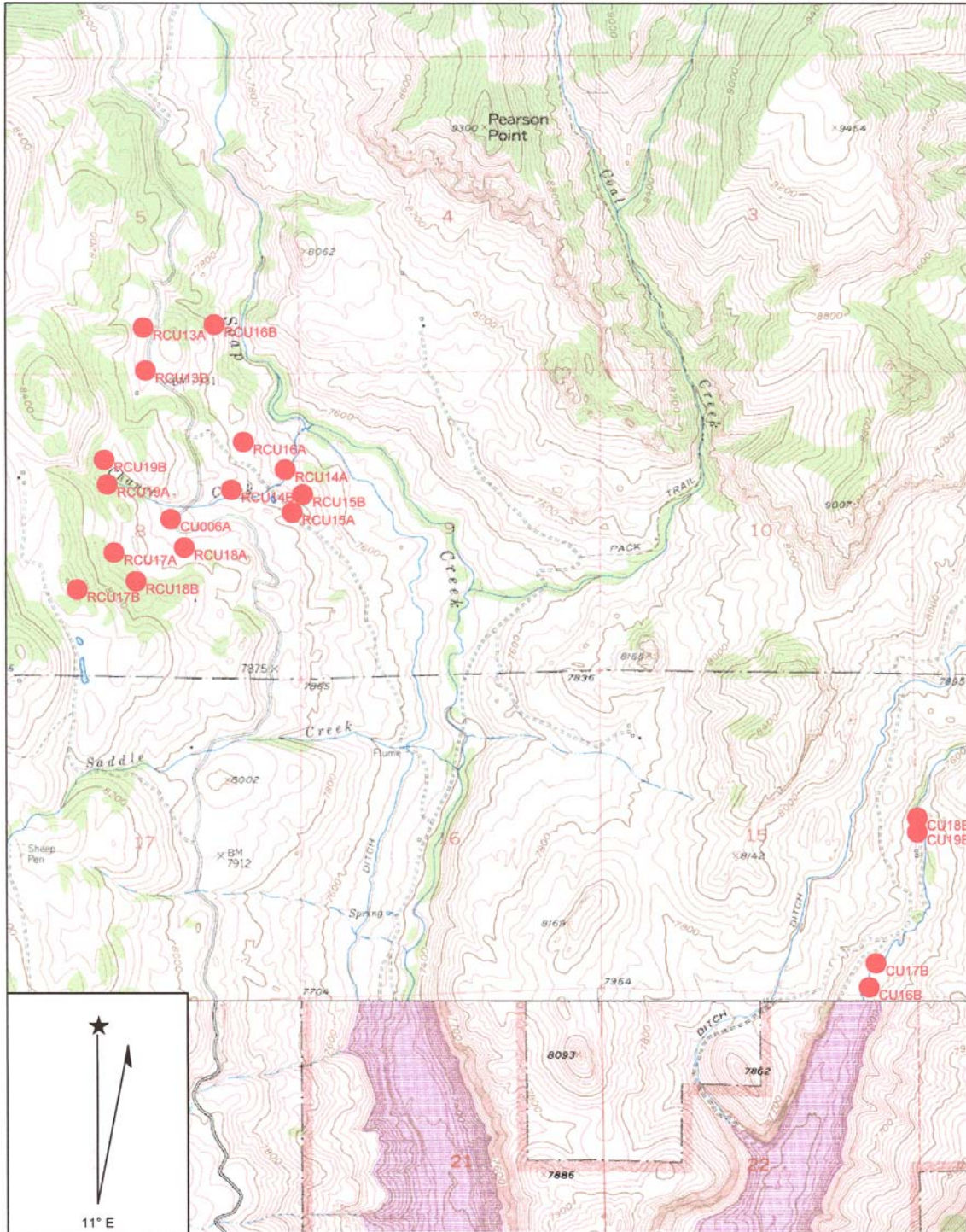
CURE 2 of 10

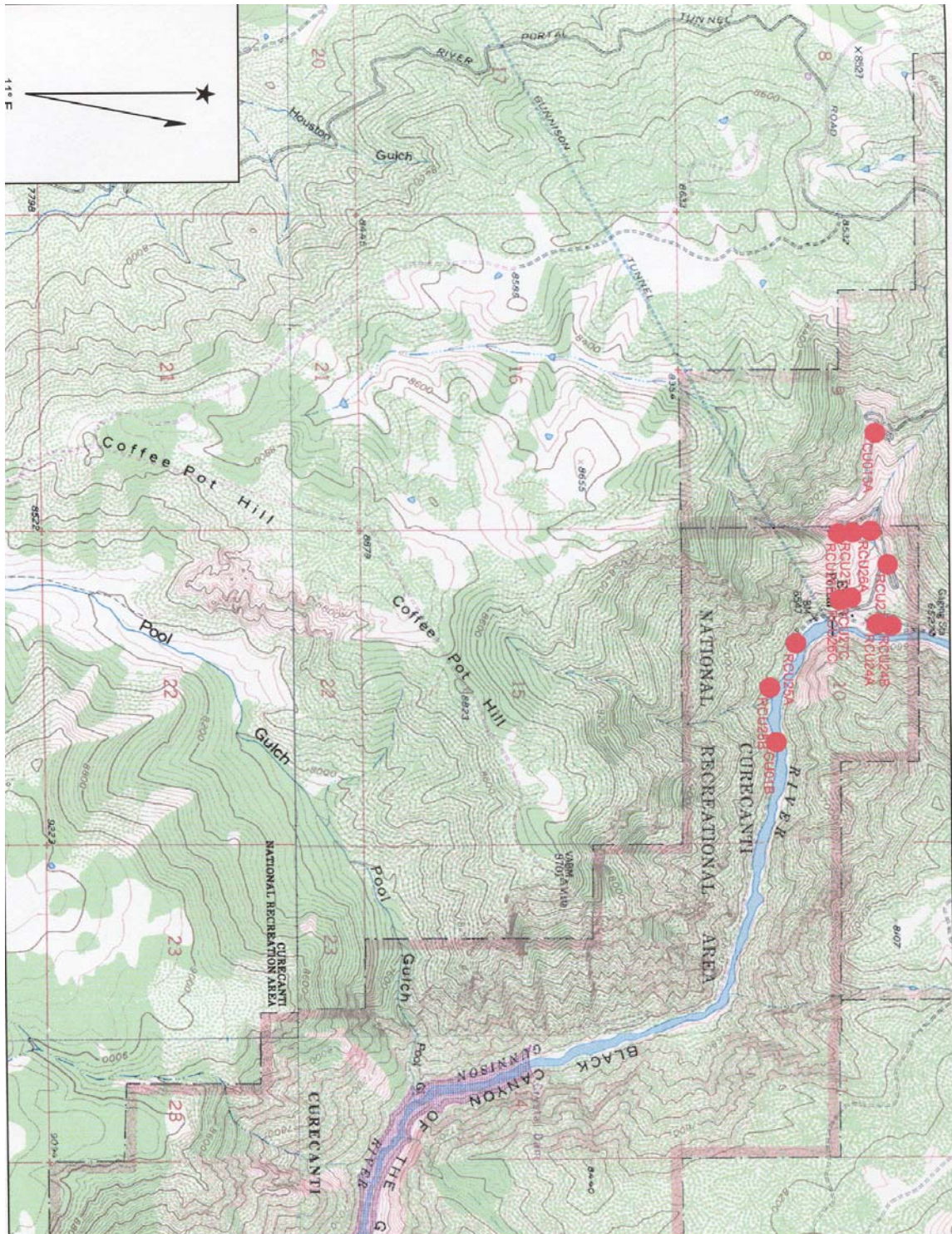


CURE 3 of 10

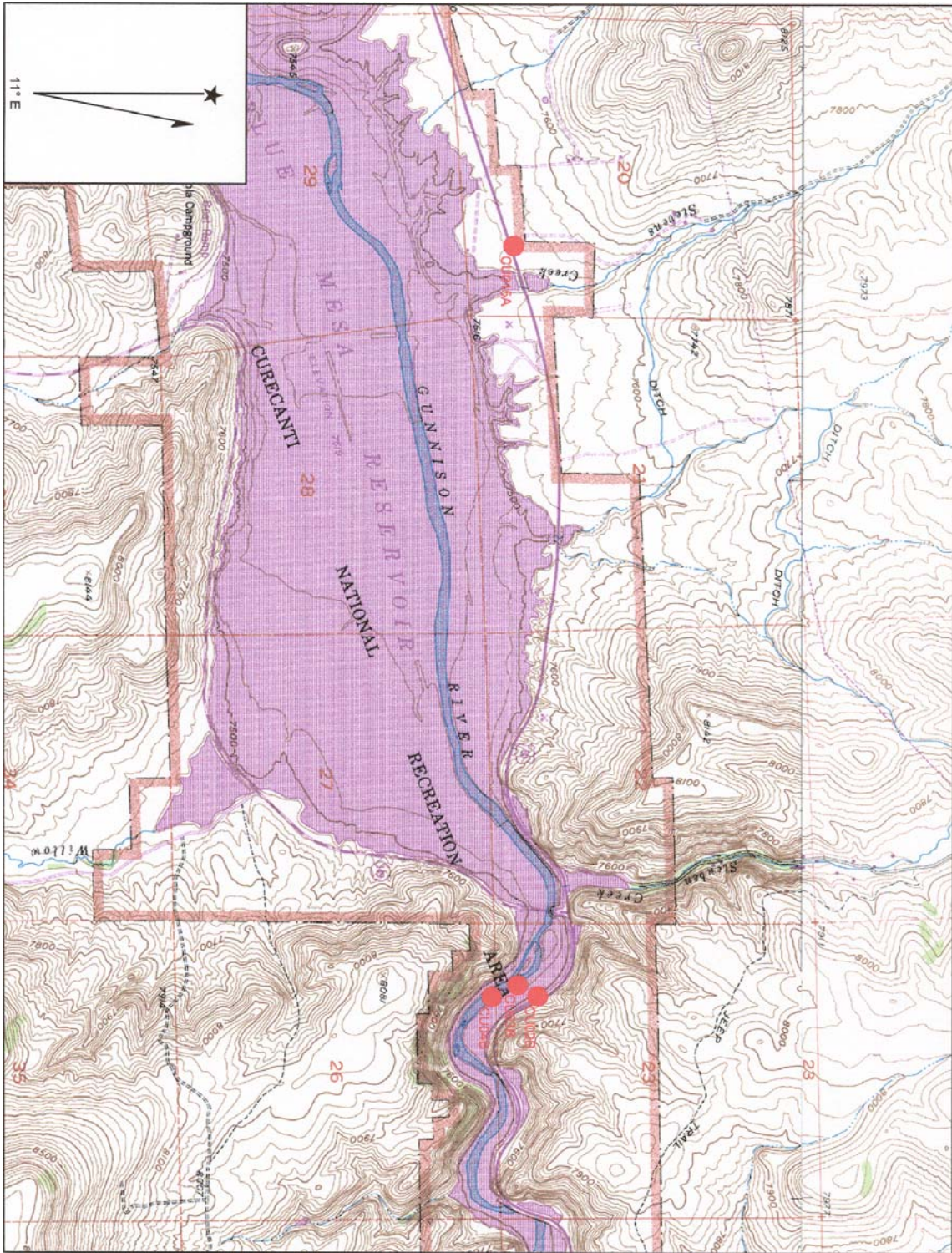


CURE 4 of 10

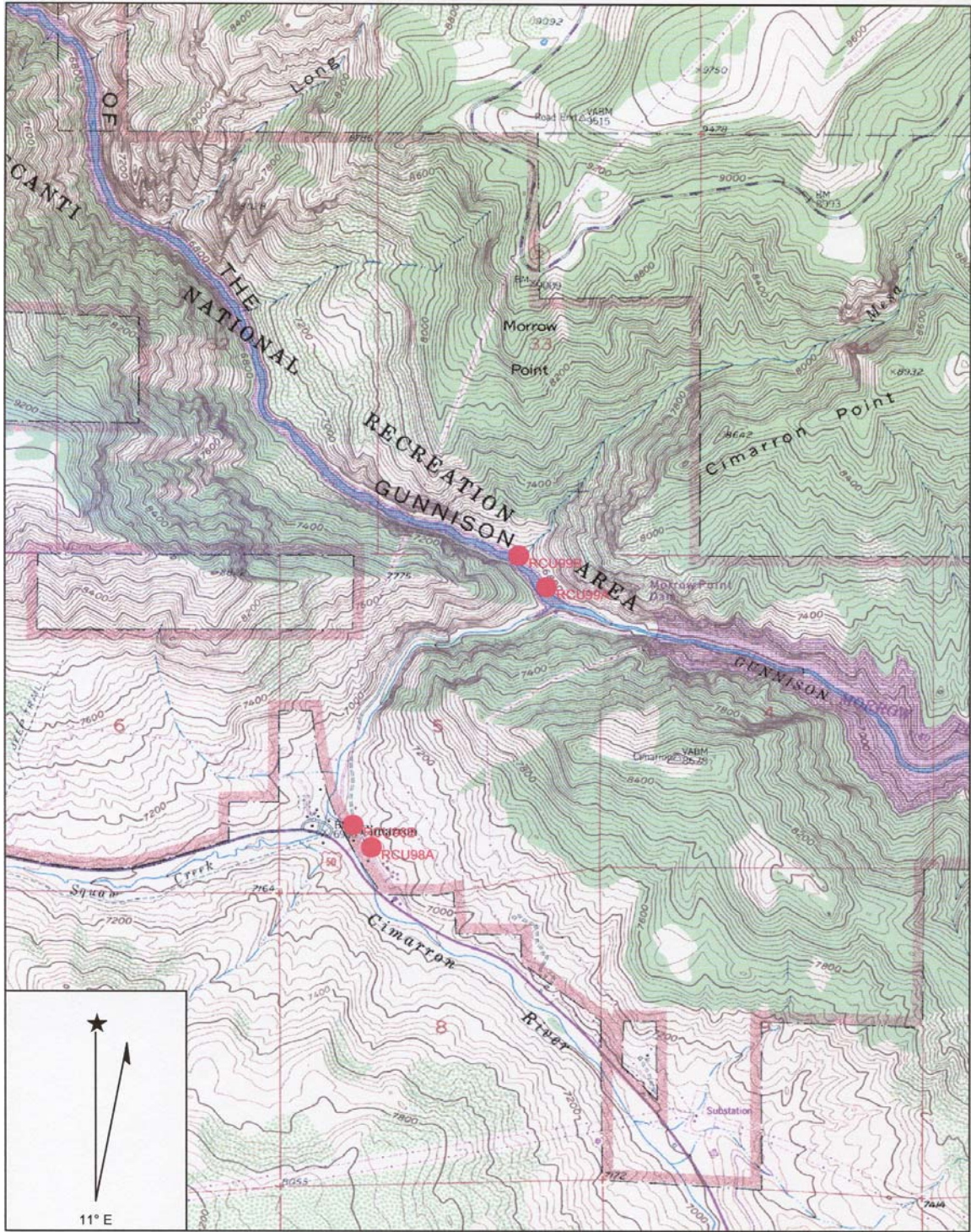


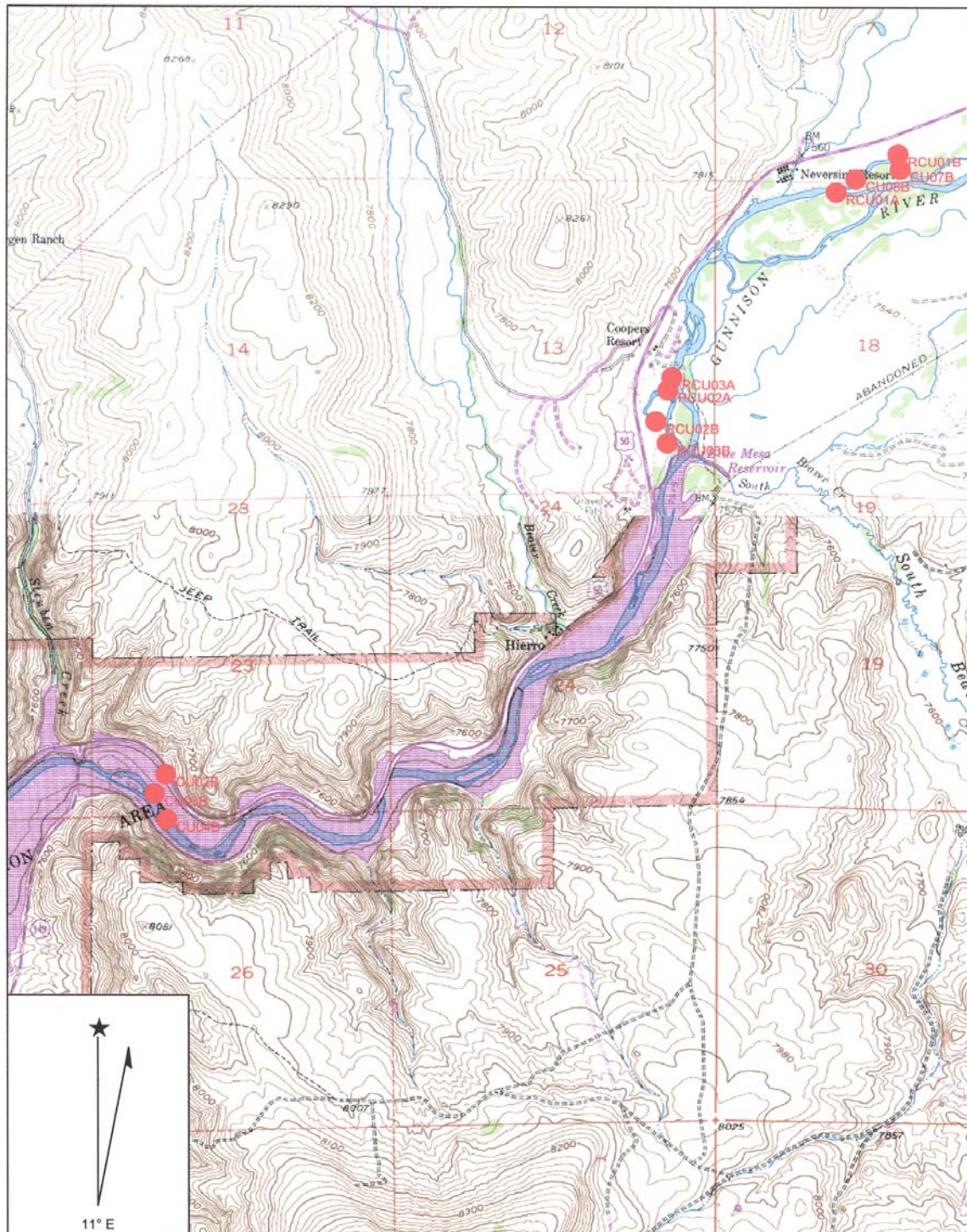


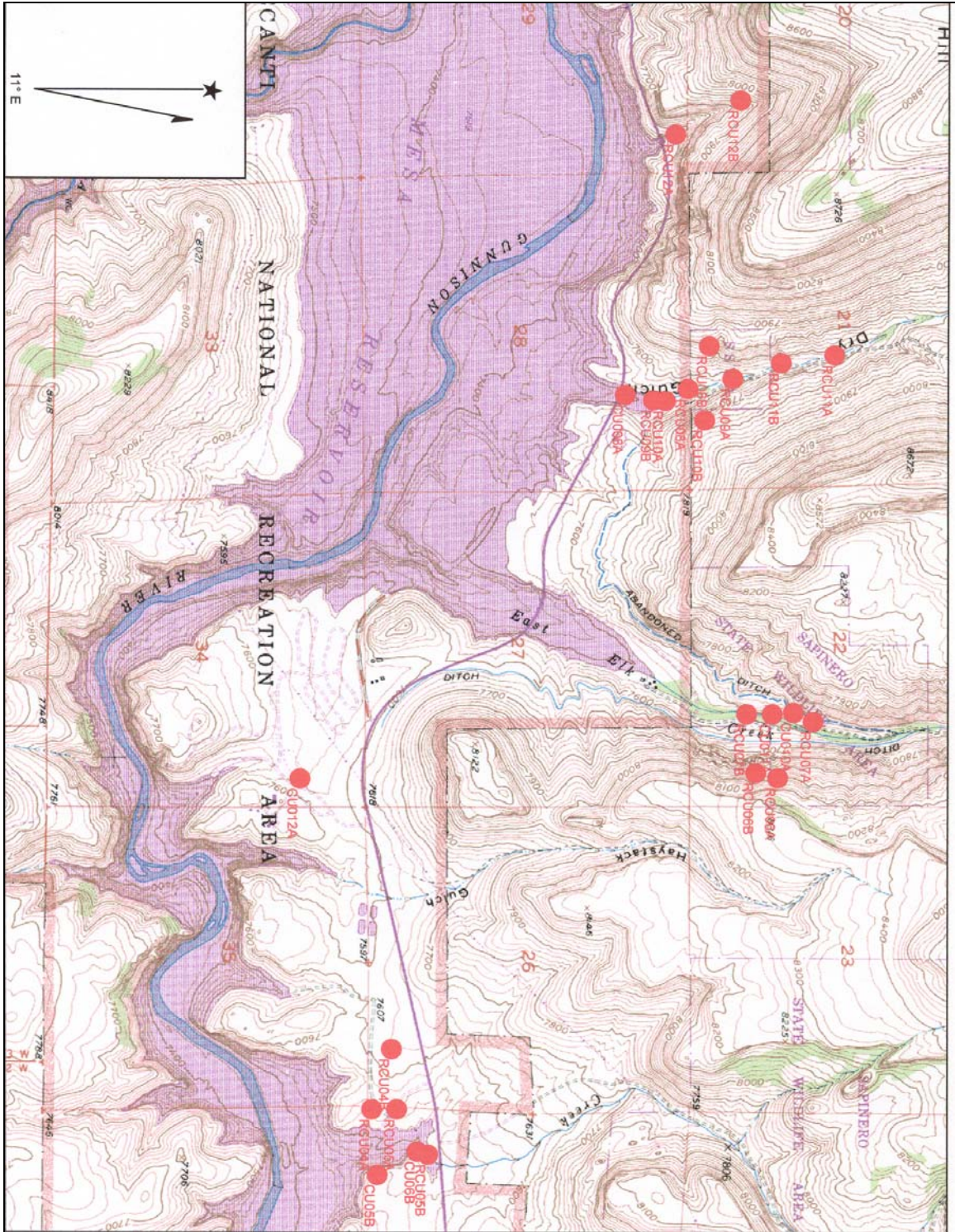
Map 6 of 10



Map 7 of 10



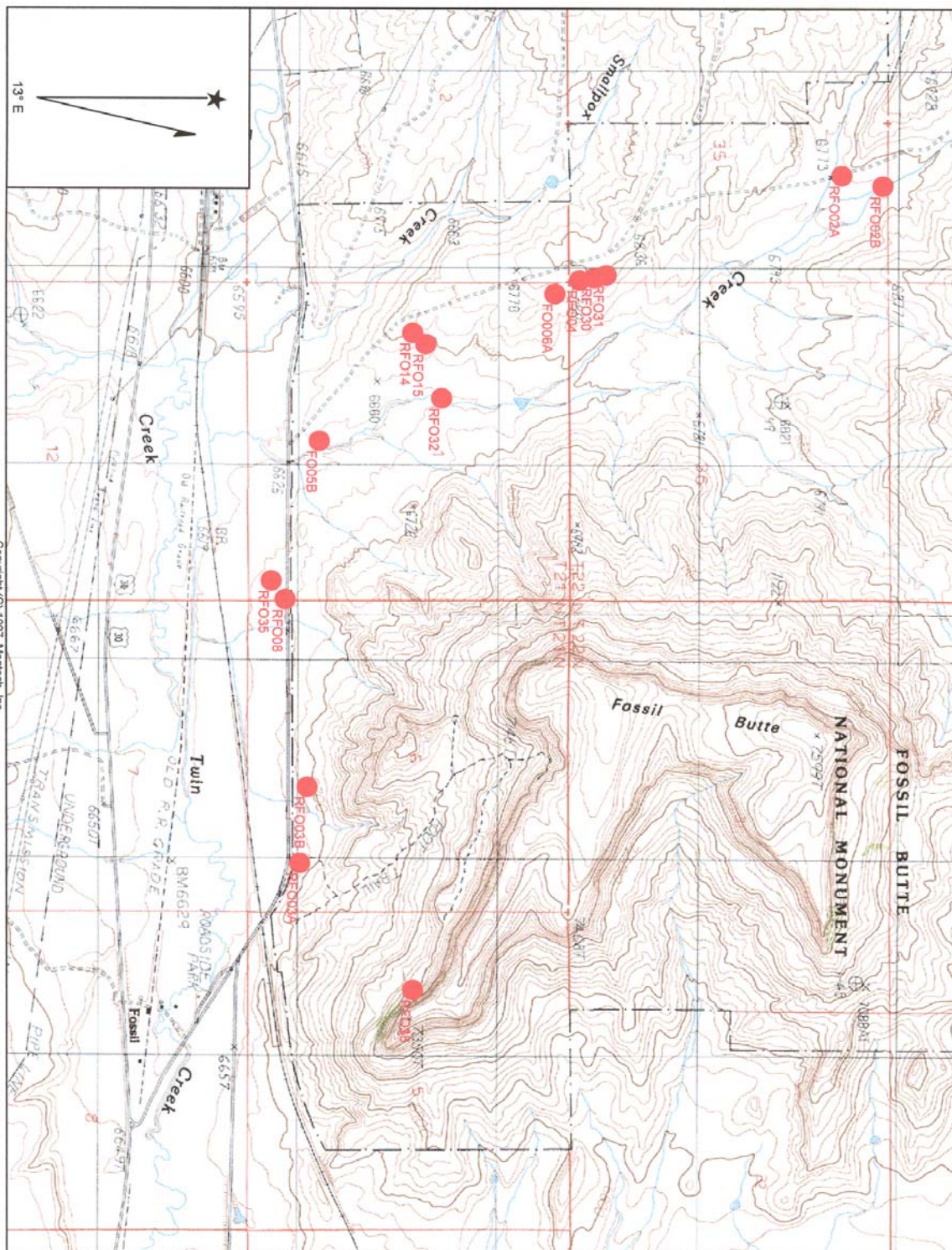




Fossil Butte National Monument

2001 & 2001
Mammal Study Sites
and
Corresponding Waypoints

Maps 1-2

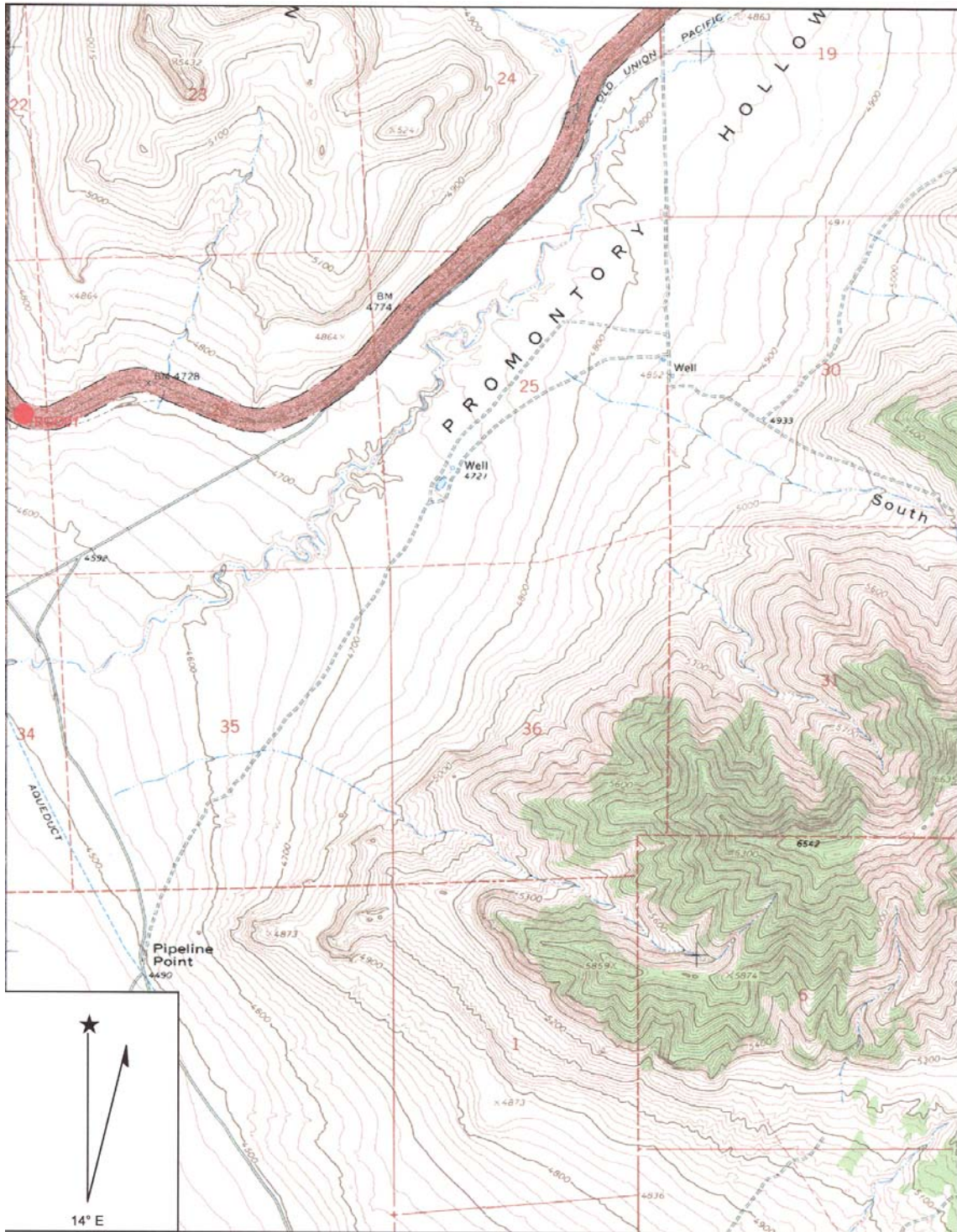


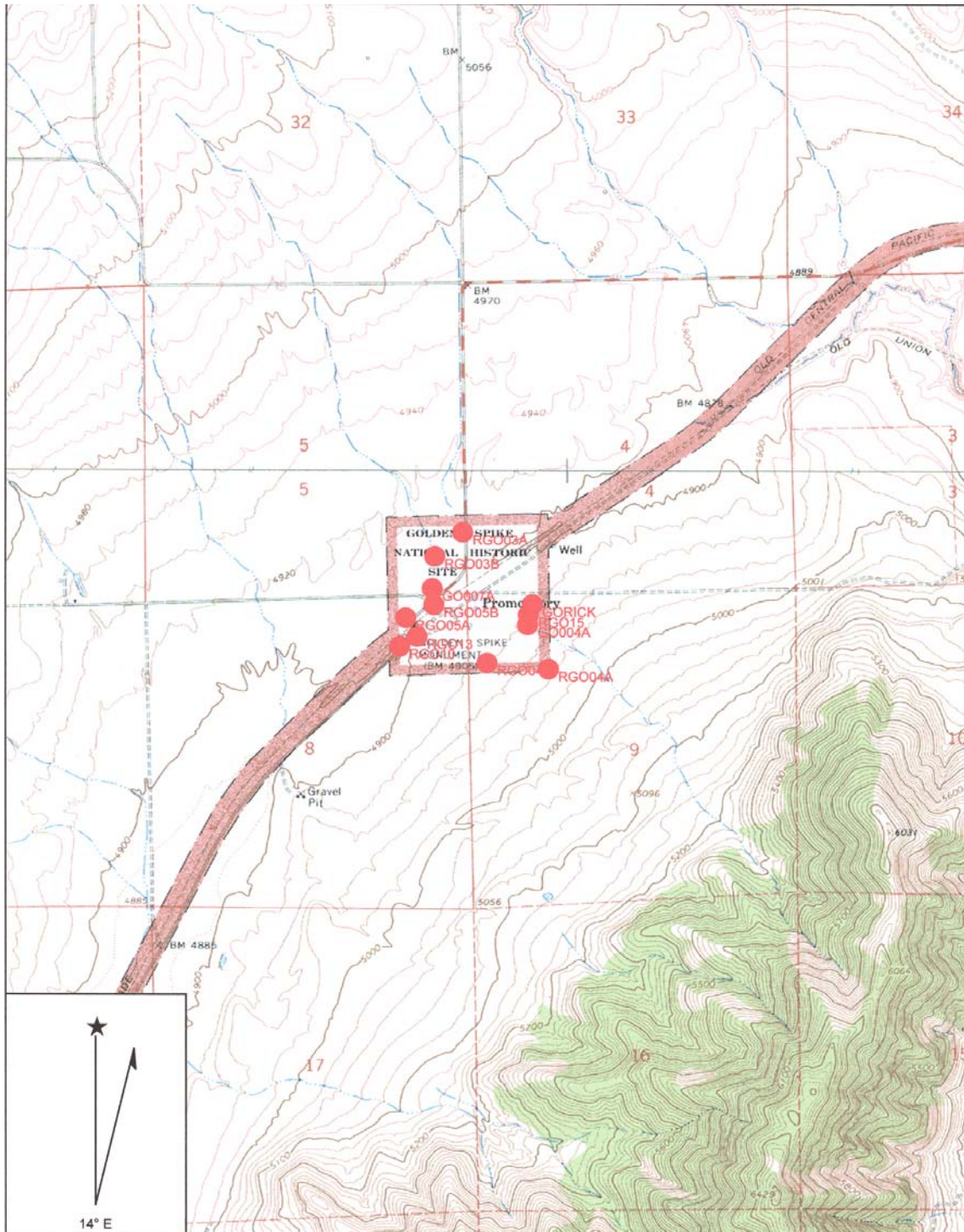


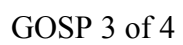
Golden Spike National Historic Site

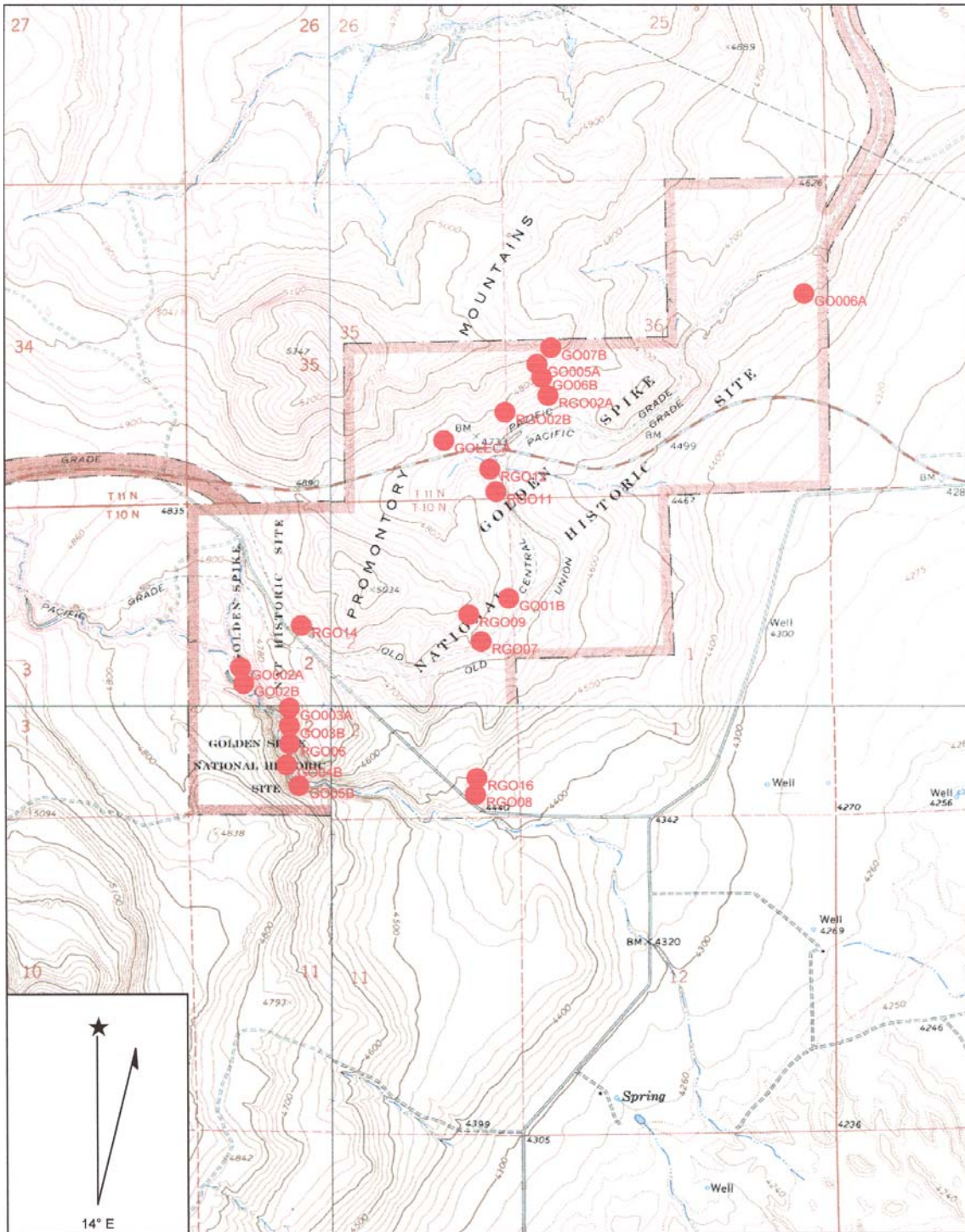
2001 & 2002
Mammal Study Sites
and
Corresponding Waypoints

Maps 1-4





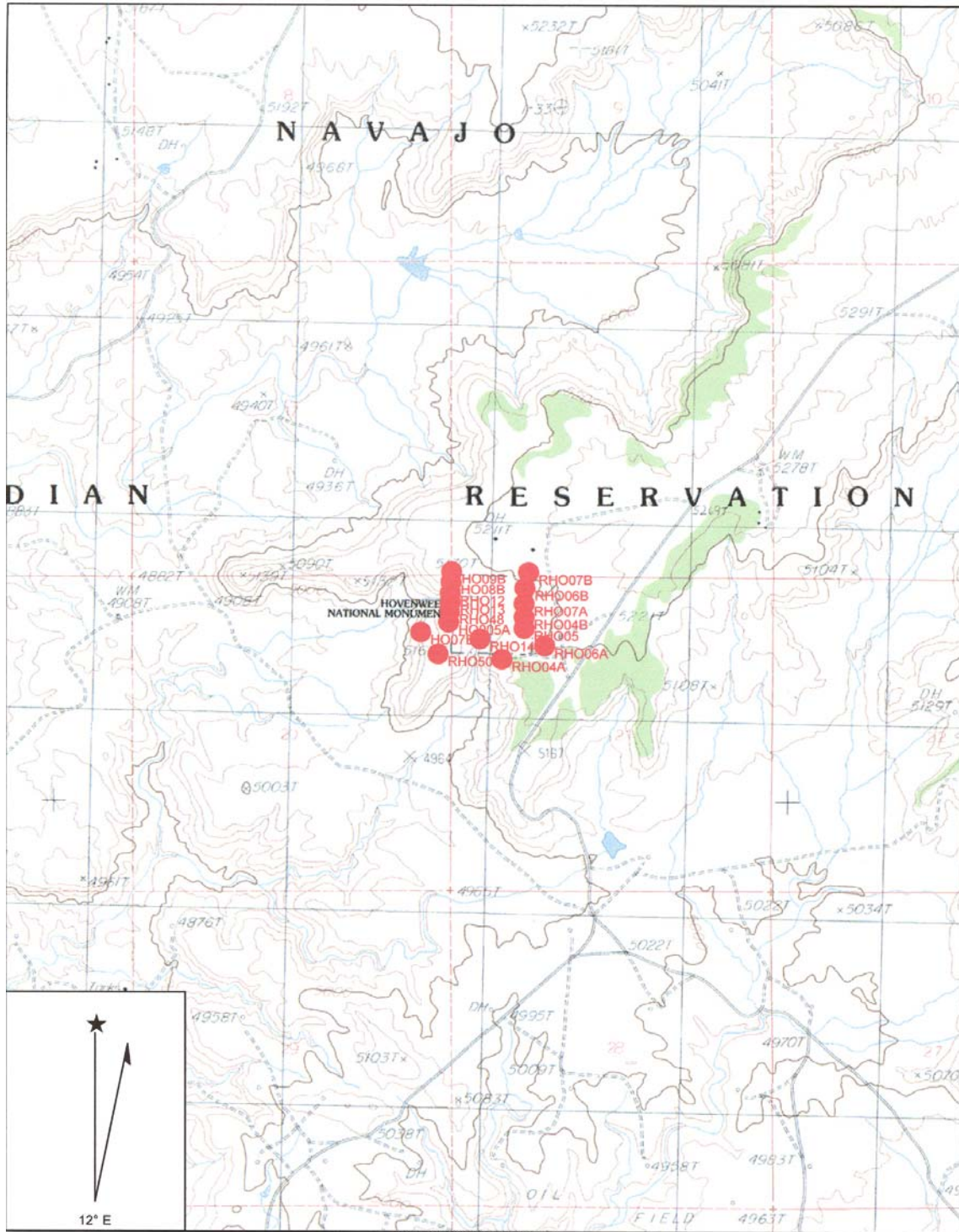




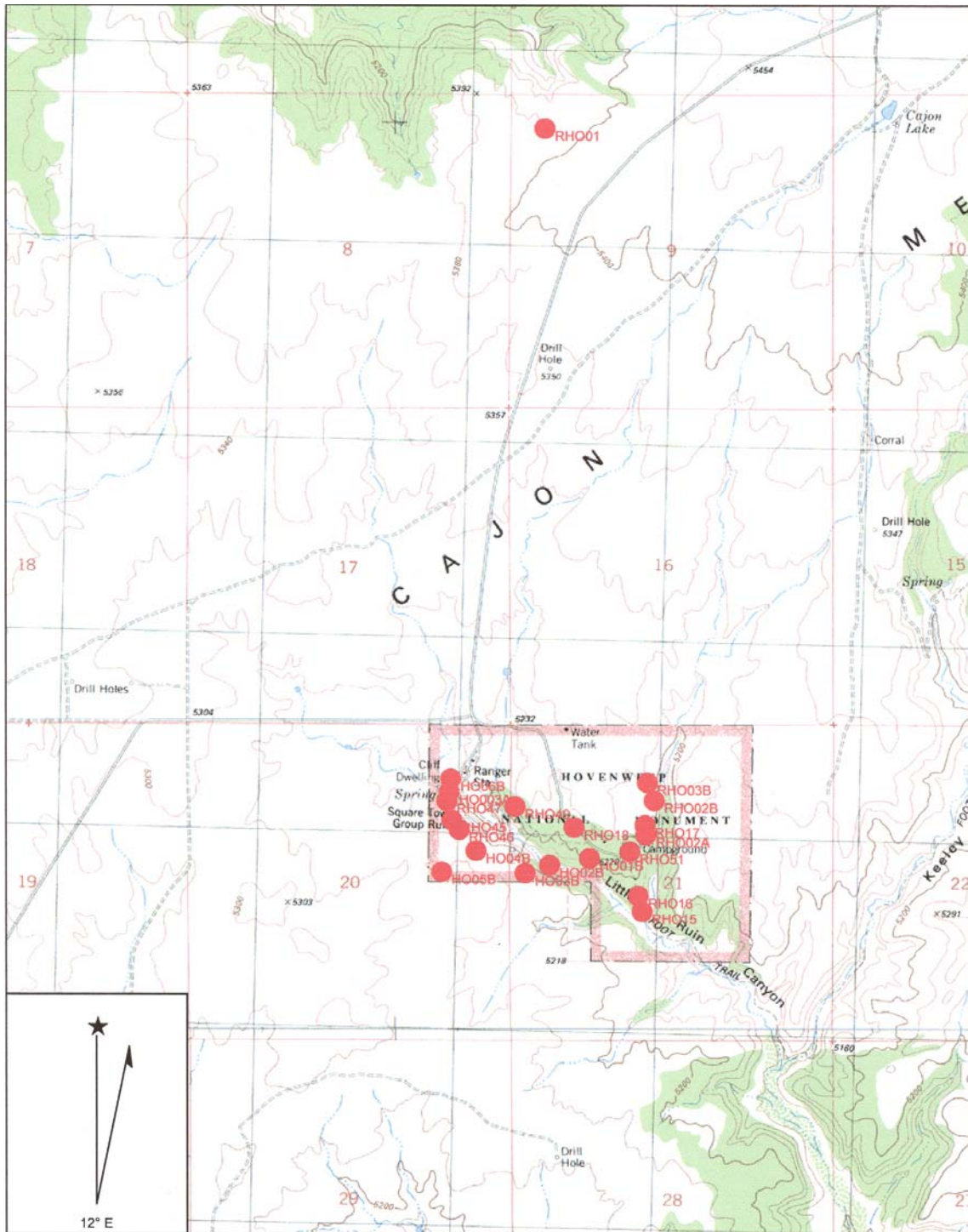
Hovenweep National Monument

2001 & 2002 Mammal Study Sites and Corresponding Waypoints

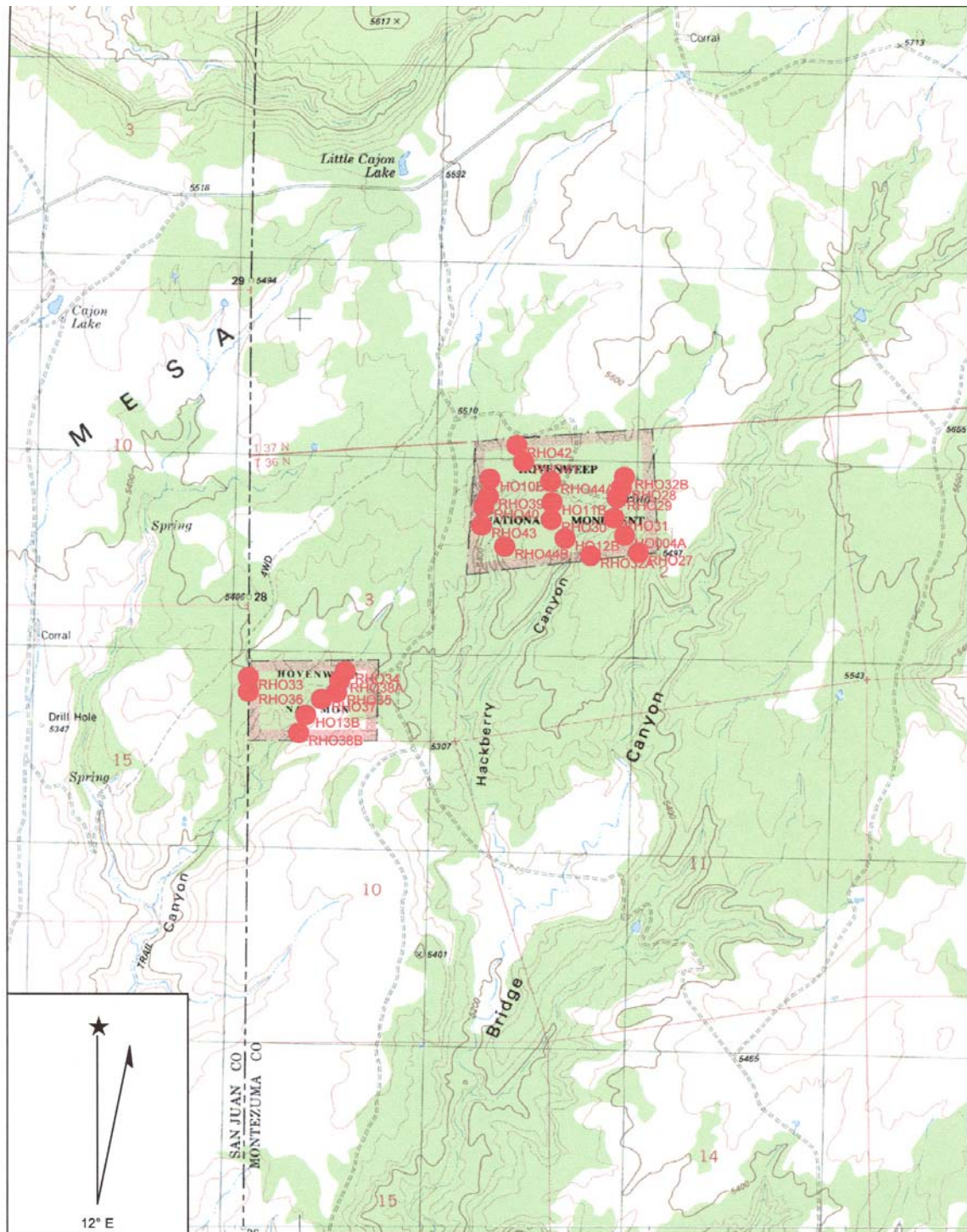
Maps 1-12



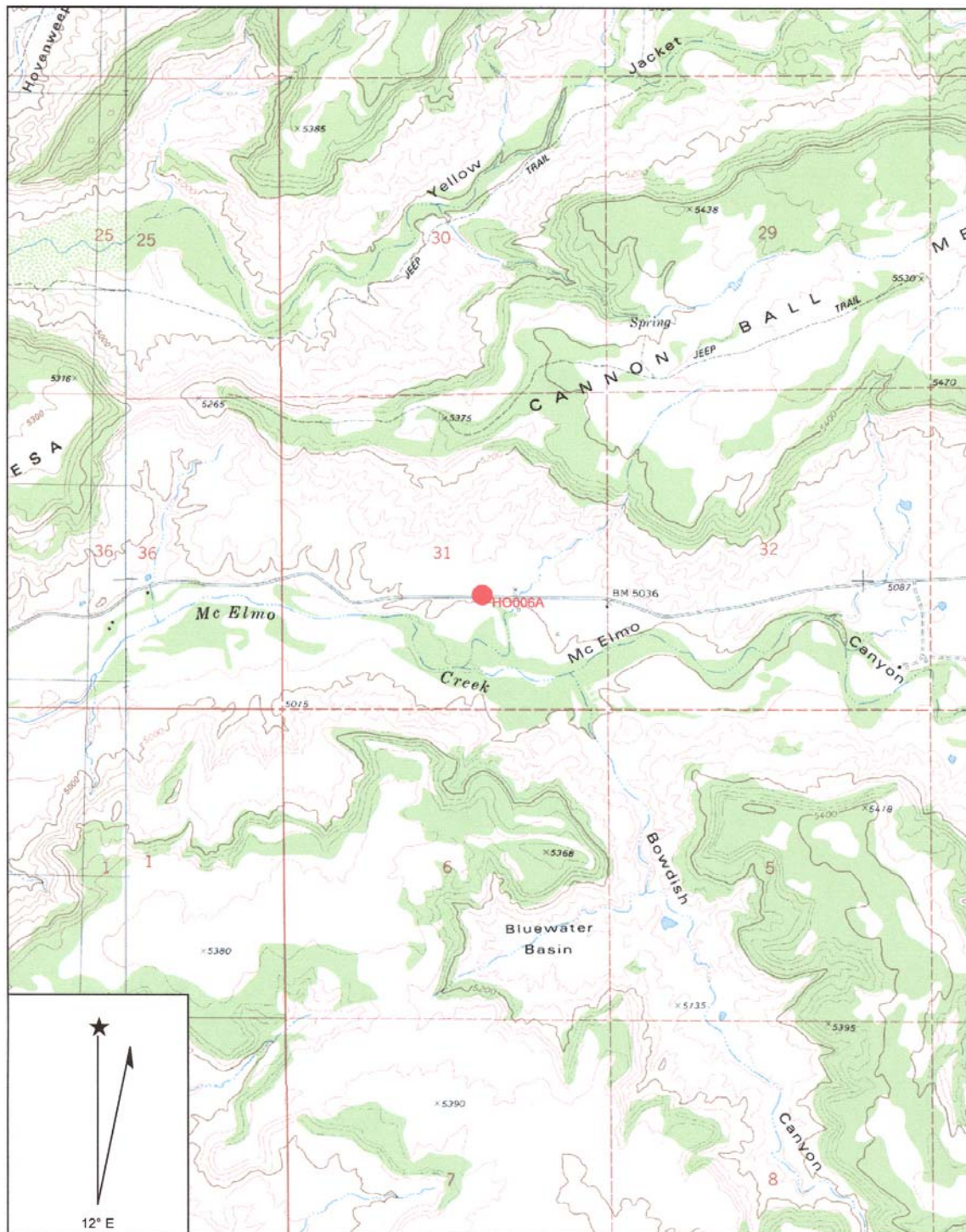
Hove 1 of 12



HOVE 2 of 12

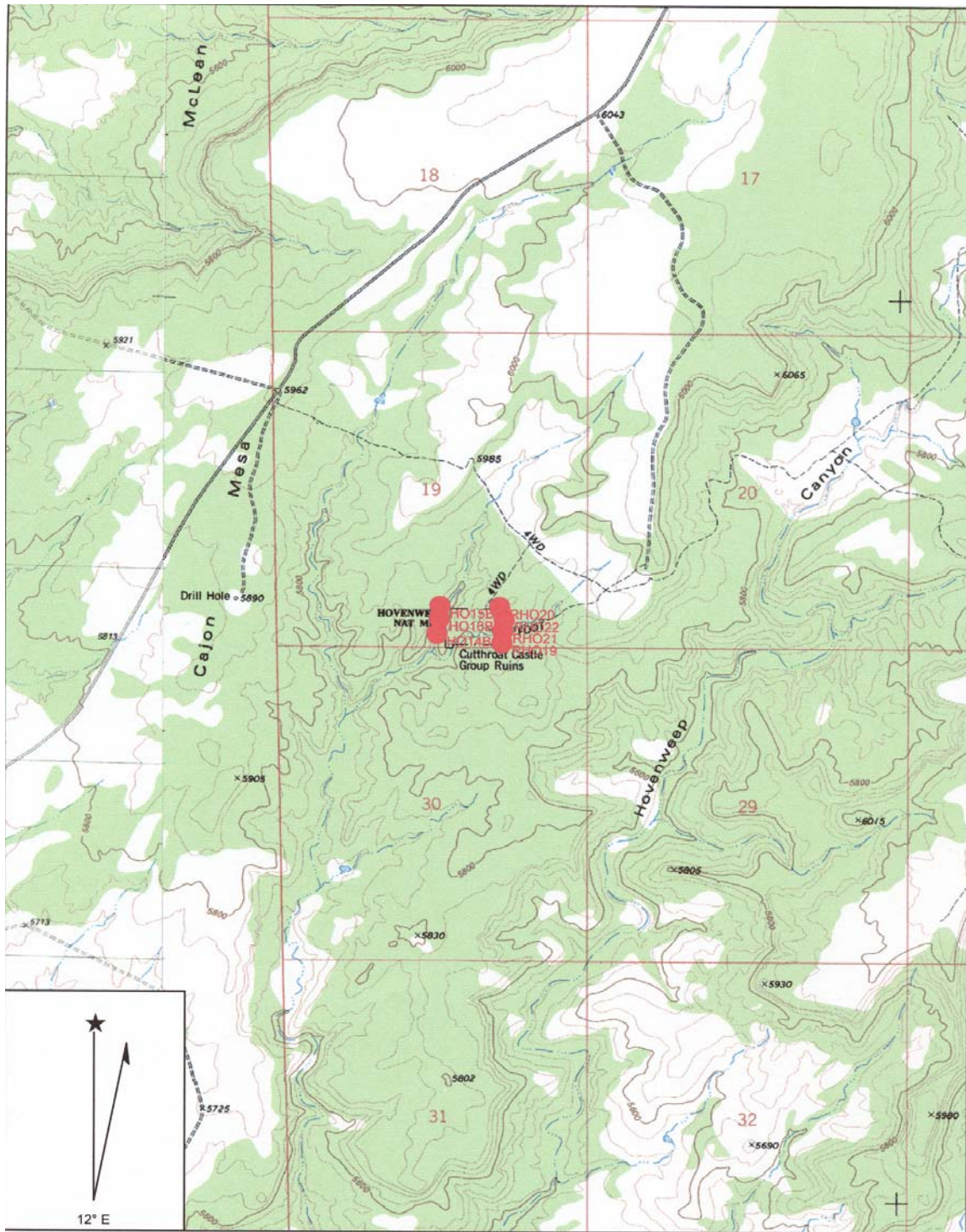


HOVE 3 of 12

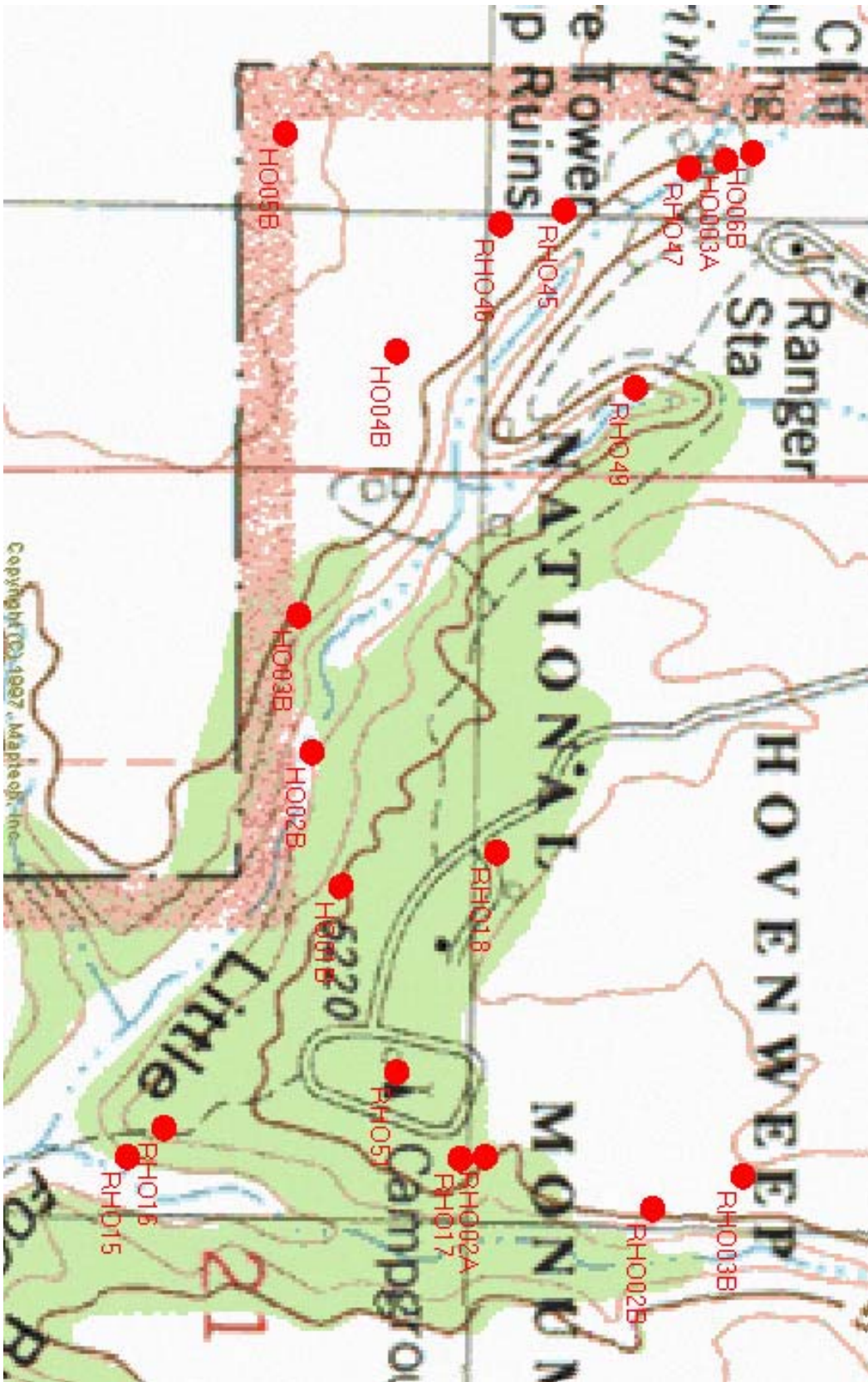


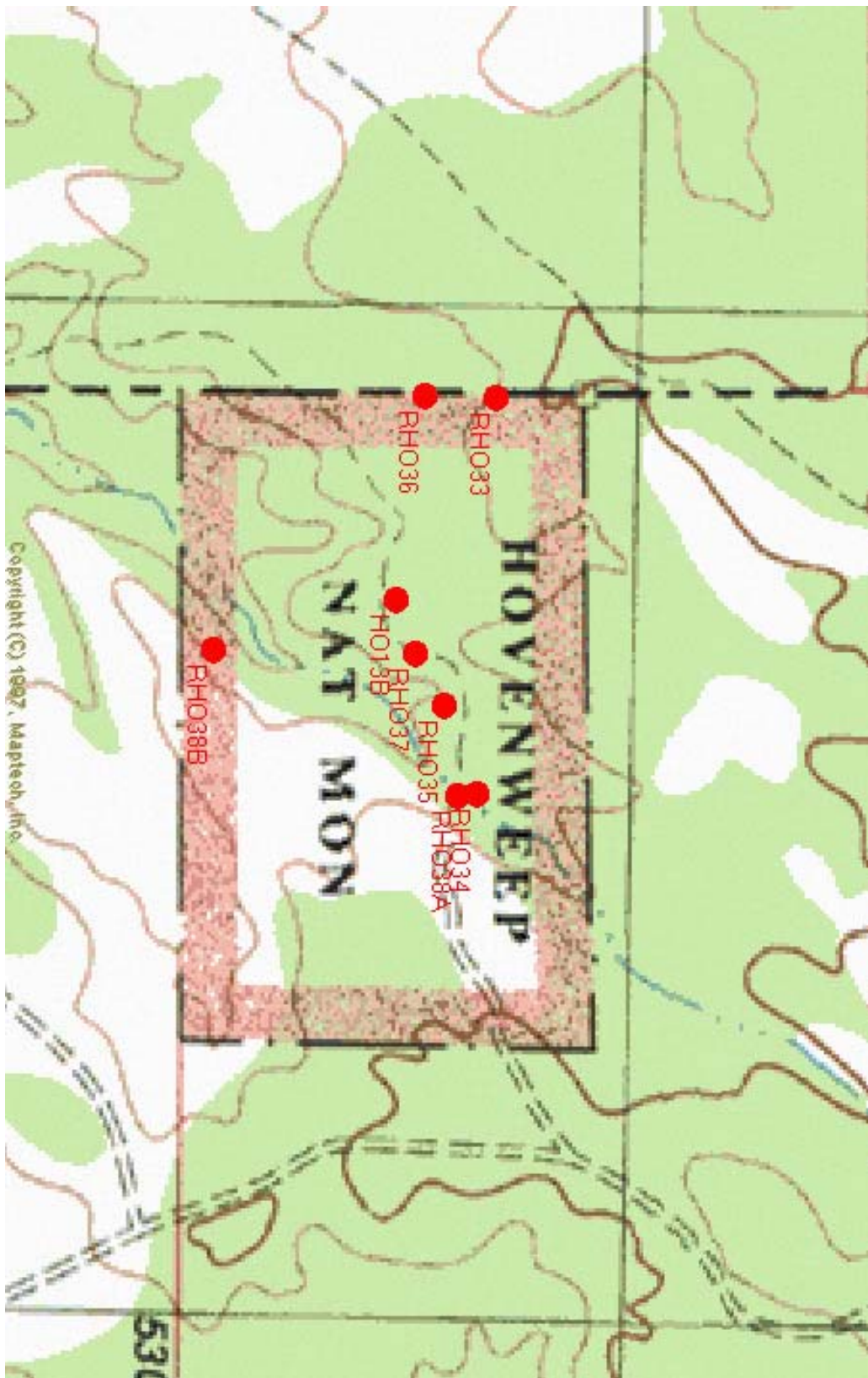
HOVE 4 of 12

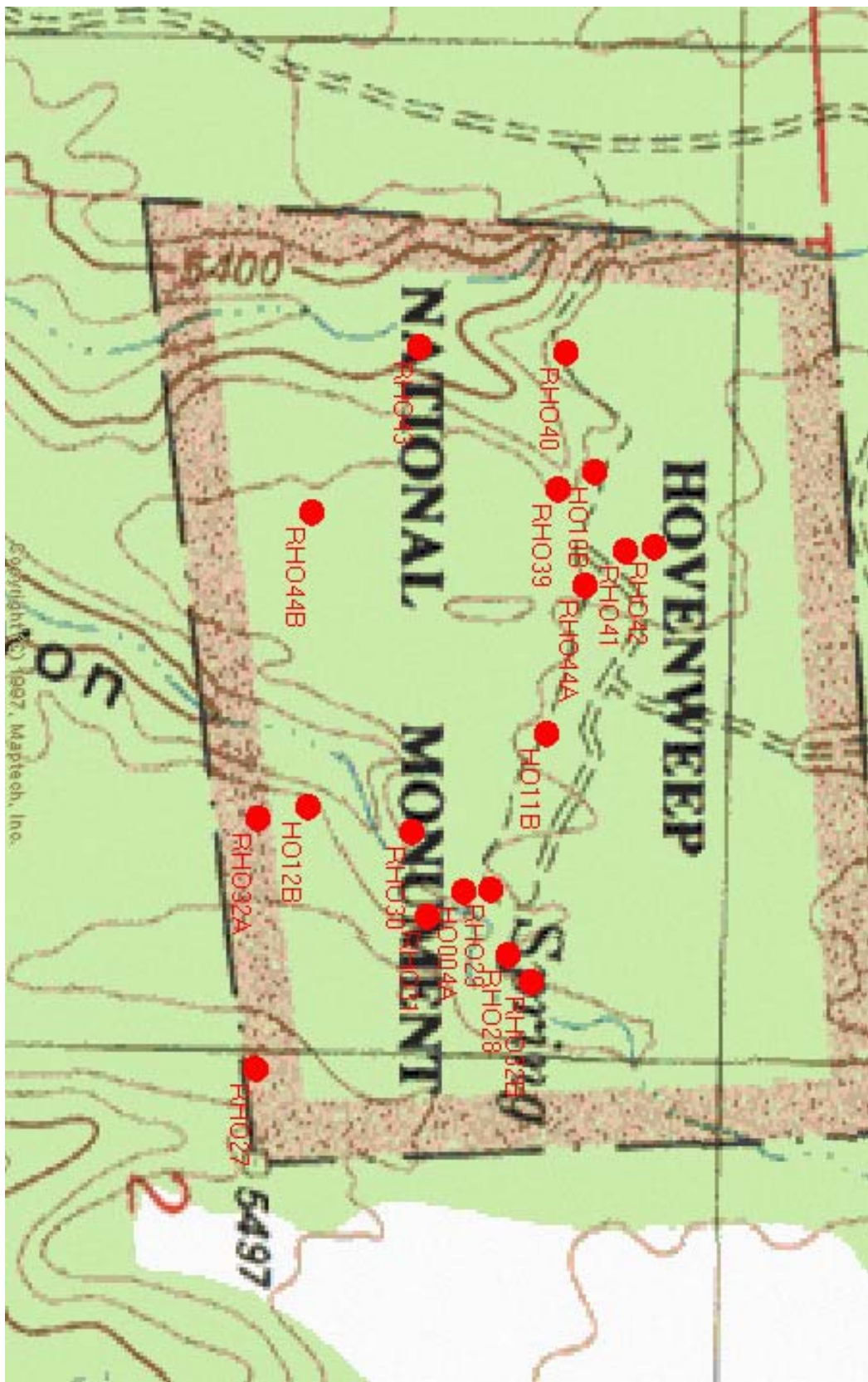


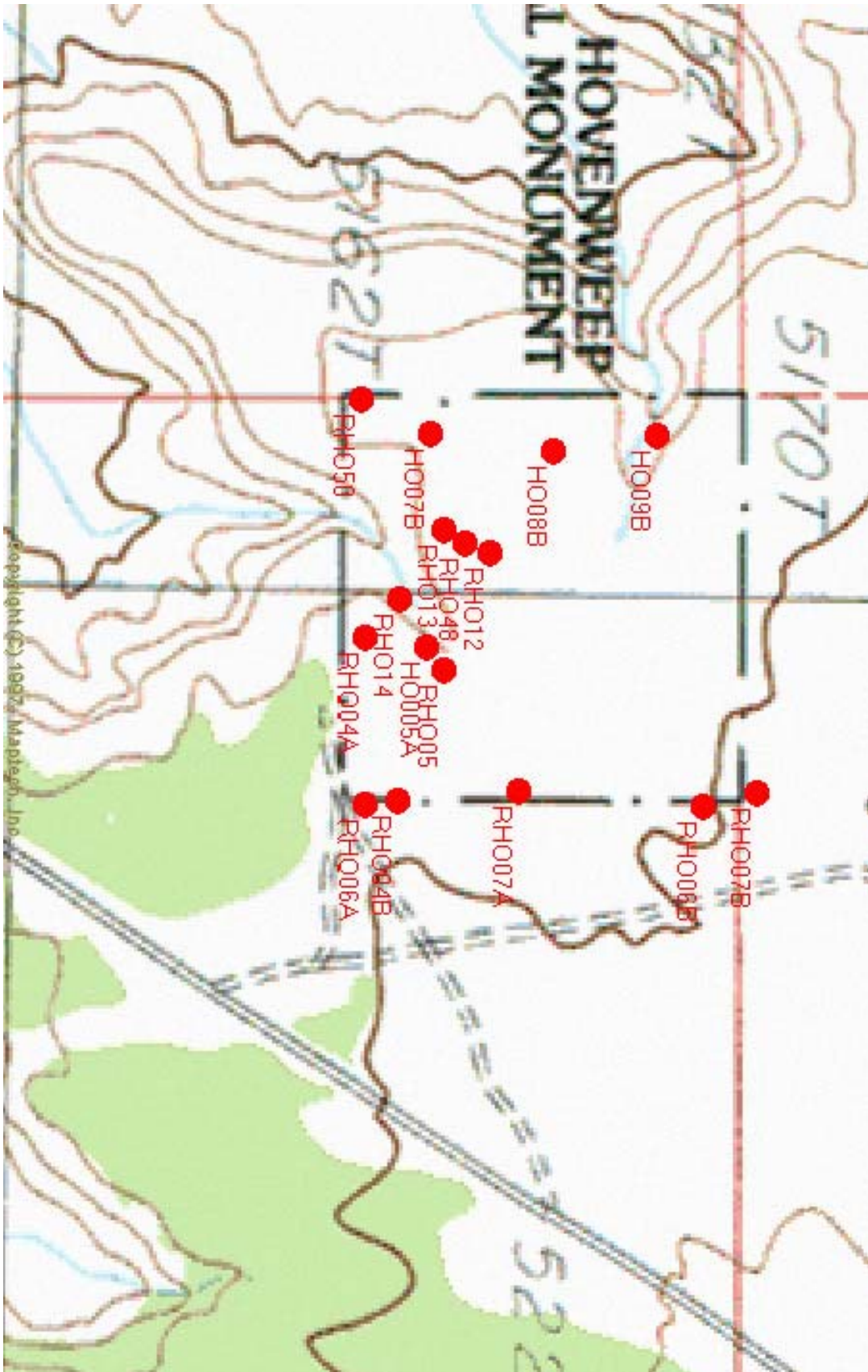


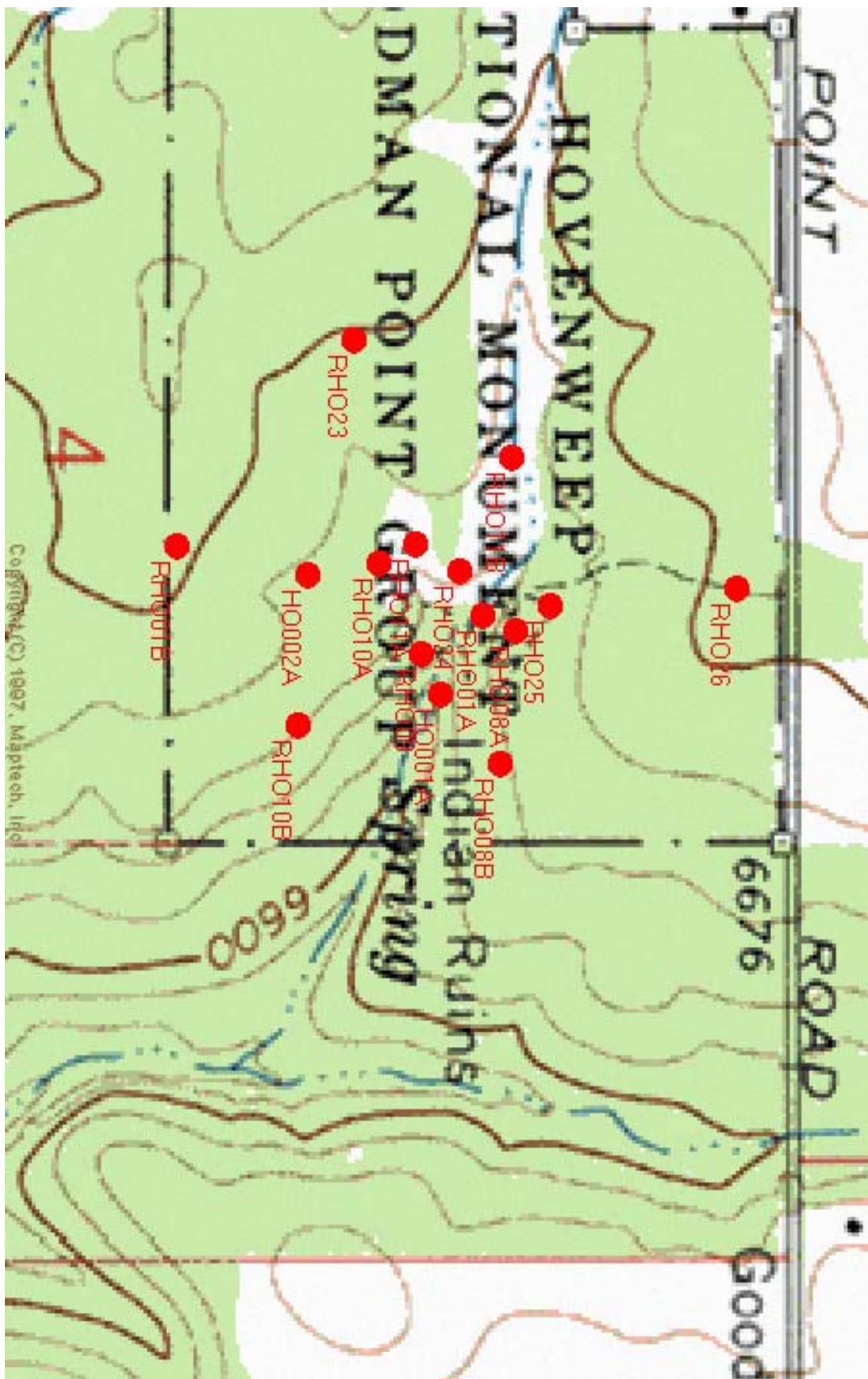
HOVE 6 of 12

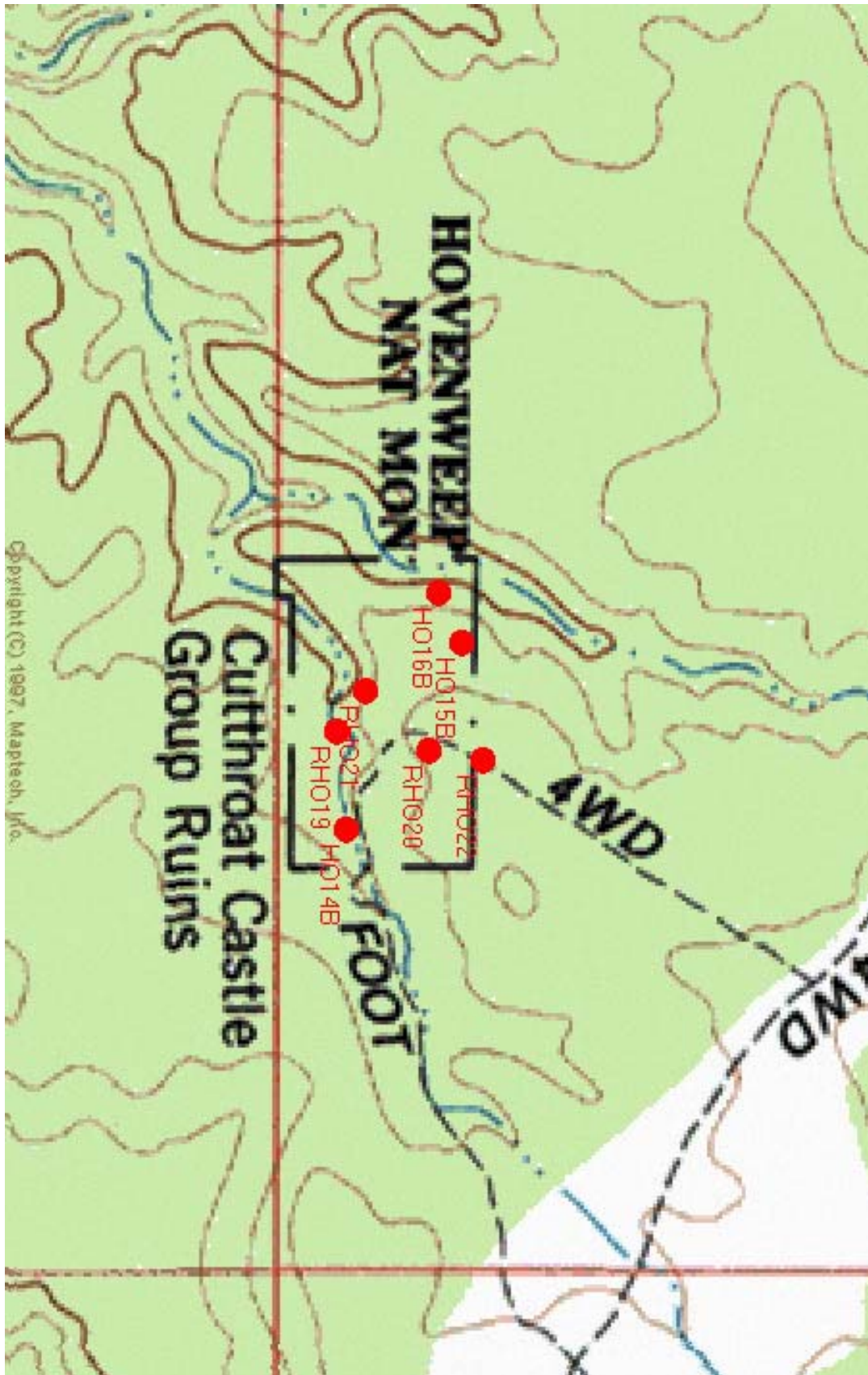












Pipe Spring National Monument

2001 & 2002
Mammal Study Sites
and
Corresponding Waypoints

Maps 1-2



Timpanogos Cave National Monument

2001 & 2002
Mammal Study Sites
and
Corresponding Waypoints

Map 1

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Research Professor in Biology, University of New Mexico, Albuquerque, 1994-present
Curator of Vertebrates, Museum of Southwestern Biology, Albuquerque, 1993-present

Pertinent Recent Publications: (Home Page: <http://www.fort.usgs.gov>)

Bogan, M.A. 2001. Western bats and mining. Pp. 41-50 in Bat Conservation and Mining: A technical interactive forum. K.C. Vories and T. Throgmorton, eds. U.S. Department of Interior, Office of Surface Mining, Bat Conservation International, and Coal Research Center.

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Bogan, M.A. 1999. *Myotis californicus*, *Myotis ciliolabrum*, *Myotis evotis*, *Myotis griscescens*, *Myotis leibii*. In North American mammals, D.E. Wilson and S. Ruff, eds. Smithsonian Institution Press, Washington, DC.

Bogan, M.A., C.D. Allen, E.H. Muldavin, S.P. Platania, J.N. Stuart, G.H. Farley, P. Mehlhop, and J. Belnap. 1999. Southwest. Pp. 544-592 in Status and trends of the nation's biological resources, M.J. Mac, P.A. Opler, C.E. Puckett Haecker, and P.D. Doran, eds. U.S. Department of Interior, U.S. Geological Survey, Reston, VA.

Bogan, M. A., J. Osborne, and J. Clarke. 1997. Observations of bats at Badlands National Park, South Dakota. *Prairie Naturalist*, 28:115-123.

Chung-MacCoubrey, A. and M.A. Bogan. in press. Bats of the piñon-juniper woodlands of southwestern Colorado. In Ancient piñon-juniper woodlands: Natural history of the Mesa Verde country .M.L. Floyd, W.H. Romme, and M. Colyer, eds. University Press of Colorado, Boulder.

Cryan, P.M. and M.A. Bogan. in press. Recurrence of the Mexican long-tongued bat at historic roosting sites. *Western North American Naturalist*.

Cryan, P. M., M. A. Bogan, and J. S. Altenbach. 2000. Effect of elevation on distribution of female bats in the Black Hills, South Dakota. *Journal of Mammalogy*, 81:719-725.

Cryan, P.M., M.A. Bogan, and G.M. Yanega. 2001. Roosting habits of four bat species in the Black Hills of South Dakota. *Acta Chiropterologica*, 3:43-52.

Kennedy, M. L., P. K. Kennedy, M. A. Bogan, and J. L. Waits. 2002. Geographic variation in the black bear (*Ursus americanus*) in the eastern United States and Canada. *The Southwestern Naturalist*, 47:257-266.

Kennedy, M. L., P. K. Kennedy, M. A. Bogan, and J. L. Waits. 2002. Taxonomic assessment of the subspecific taxonomy of the black bear (*Ursus americanus*) in the Eastern United States. *The Southwestern Naturalist*, 47:335-347.

Frey, J.K., R.D. Fisher, M.A. Bogan, and C. Jones. 2002. First record of the Arizona cotton rat (*Sigmodon arizonae*) in New Mexico. *The Southwestern Naturalist*, 47:491-493.

Mollhagen, T. R., and M. A. Bogan. 1997. Bats of the Henry Mountains region of southeastern Utah. *Occasional Papers, Museum of Texas Tech University*, 170:1-13.

O'Shea, T. J. and M. A. Bogan (eds.). 2000. Interim Report of the Workshop on Monitoring U.S. Bat Populations: Problems and Prospects. U.S. Geological Survey, Midcontinent Ecological Science Center, Fort Collins, Colorado. 124 pp. Available: <http://www.fort.usgs.gov/BPD/ireport.htm>

Piaggio, W.J., E.W. Valdez, M.A. Bogan, and G.S. Spicer. 2002. Systematics of *Myotis occultus* (Chiroptera: Vespertilionidae) inferred from sequences of two mitochondrial genes. *Journal of Mammalogy*, 83: 386-395.

Valdez, E.W., J.R. Choate, M.A. Bogan, and T.L. Yates. 1999. Taxonomic status of *Myotis occultus*. *Journal of Mammalogy* 80:545-552.

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EDUCATION

- 2001 Biology.** University of New Mexico. Pursuing doctorate degree in biology.
- 2000 M. S. Zoology, Ecology and Systematics Division.** Brigham Young University (BYU), Provo, Utah. Awarded Clarence Cottam Scholarship for excellence in Conservation Biology 1999.
- 1998 B. S. Conservation Biology, Wildlife Biology emphasis.** Brigham Young University. Dean's Honor roll, university scholarships. Nominated to the NCNSA (National Collegiate Natural Sciences Awards).

WORK EXPERIENCE

RESEARCH:

Research Crew Leader, BYU (7/2000)

- ◆ Conduct and lead insect bio-diversity survey on the Grand Staircase-Escalante National Monument, Utah. Experience working in harsh environment, using GPS, collection and preparation of museum specimens.

Research Crew Leader (5/98-8/98, 5/99-8/99) and Field Technician, BYU (4/97-8/97)

- ◆ Run demography studies on Utah populations of the American black bear, *Ursus americanus*. Summer studies include hair-snag stations, track surveys, vegetation surveys (with Quarter-transect method); live-trapping large and small mammals and mist-netting bats; sedation and handling of black bears, four wheel drive/chains, hauling cargo trailers, and off-road vehicles. Winter field experience with dened adult bears and cubs, air and ground radio telemetry, snow mobile operation, dense brush, and working in adverse conditions. Also did data entry, maintained current data bases, and data analysis for reports to management agencies and research.

Laboratory Technician, BYU (1/99-6/99) and Assistant, USFS Shrub Lab (5/98)

- ◆ DNA extraction of animal tissues and hair follicles and micro satellite amplification for genetic analysis of Utah black bear populations. USFS Shrub lab work with DNA extraction and Restriction Fragment Length Polymorphism (RFLP) amplification of *Bromus tectorum* mother strains for US Forest Service research grant.

TEACHING:

Teaching Assistant, University of New Mexico (8/2000-present), BYU (8/97-6/00)

- ◆ **Biology 121, 122 (Labs)**—Teach general principles of biology in lab setting; prepare quizzes, grade student work.
- ◆ **Zoology 344 (Natural History of Vertebrates)**-- Teach diagnostic characteristics and natural history for taxonomic identification of avian, mammal, reptile, amphibian, and fish families and species, lead field trips, create and administer exams, direct students with writing natural history species accounts.
- ◆ **Zoology/Botany 351 (Ecology Laboratory)**--Prepare and instruct ecological experiments, lead student field trips, guide students in critical analysis of ecological principles, assist student writings and revisions, grade student work.
- ◆ **Biology 134 (Intro. To Natural History)**-- Teach general principles of biology and natural history of vertebrates, lead and assist in field trips (bird watching), teach taxonomic characters, help students to identify vertebrates in the field (birds, mammals, herps).

PUBLICATIONS AND PRESENTATIONS AT PROFESSIONAL MEETINGS

Harding, L. 2000. Prints in the dust: Differential habitat utilization, movement patterns, and behavior of the American black bear from hound transects on the East Tavaputs Plateau, Utah. Seventh Western Black Bear Workshop, Coos Bay, OR. 2-4 May 2000. (Presentation and published abstract).

Harding, L. 2000. Utah Bats: Natural history and control. Invited speaker to the annual meeting of the Utah Animal Control Association, St. George, UT. 20 January 2000 (Presentation).

Harding, L., E. Sinclair, K. Crandall, and H. L. Black. 1999. Monitoring black bears with hair trap transects and DNA fingerprinting. Annual Meeting of the Utah Chapter of The Wildlife Society, Ruby's Inn, Bryce Canyon Ntl. Park, UT. 18-20 March 1999 (Presentation and published abstract).

Harding, L., R. Smith, J. Tolman, S. Bunnell, and H. L. Black. 1998. Old technology, new application: Dog-derived bear transects on the East Tavaputs Plateau. Eleventh International Conference on Bear Research and Management, Gatlinburg, TN. 19-24 April 1998 (Poster and published abstract).

Tolman, J., H. L. Black, and L. Harding. 1998. Use of the quarter-point method in conjunction with Utah GAP analysis: A method for quantifying potential fall

habitat quality for the American black bear. Eleventh International Conference on Bear Research and Management, Gatlinburg, TN. 19-24 April 1998 (Poster and published abstract).

Black, H. L., and L. Harding. 1998. East Tavaputs Plateau black bears: Seven good years. Annual Meeting of the Utah Chapter of The Wildlife Society, Cedar City, UT. 2-4 April 1998 (Presentation and published abstract).

Harding, L., J. F. Barnes, J. C. Reynolds, H. L. Black, and J. T. Flinders. 1997. Interactions between mountain lions, black bears, and scavengers: A survey of biologists, houndsmen, and others. Sixth Western Black Bear Workshop, Ocean Shores, WA. 5-7 May 1997 (Poster and published abstract).

Harding, L. 1998. Invitation (a poem). In *A Blossom of Dreams*. International Library of Poetry. The Maple-Vail Manufacturing Group: Owings Mills, MD. 331 pp.

OTHER SKILLS

- ◆ Experience training and exercising horses; teaching others to ride and manage horses, care and grooming.
- ◆ Experience in skinning and preparation of museum specimens (mammals, birds, insects).
- ◆ Proficient with Word Perfect, Microsoft Word, Minitab, Microsoft Excel, and ArcView.
- ◆ Outdoor enthusiast—I enjoy hiking, horseback riding, backpacking and camping in wilderness settings, snowshoeing, cross-country skiing, bird watching, and most recreational activities.

Shauna Haymond

Curriculum Vitae

Birth date: 19 October 1972

Place of birth: Miami Beach, Florida, USA

Address: 104 Spring Dr SE, Rio Rancho, NM
87125

Phone: 505-994-3630

e-mail: shauna_heymon@juno.com

Education:

<u>Institution and location</u>	<u>Degree</u>	<u>Major</u>	<u>Dates</u>
Brigham Young University Provo, UT	B.S.	Zoology/Wildlife Biology	1990-1994
Brigham Young University Provo, UT	M.S.	Zoology/Ecology and Systematics	1995-1998

Professional experience:

Wildlife Biologist, U.S. Geological Survey, Fort Collins Science Center, Arid Lands, Field Station. Conducted mammal inventories on 13 national parks and monuments for the National Park Service Inventory and Monitoring project. May 2001-present.

Wildlife Biologist/Partner, Holistic Wildlife Services, LLC. Biological consulting for compliance and mitigation measures; expertise in surveys for cave and mine roosting bats. January 1997-present.

Biological Consultant, USDA Forest Service, Rocky Mountain Research Station. Customized and arranged acoustic bat monitoring equipment; assisted in study design. February-March 2001.

Wildlife Biologist, SWCA Environmental Consultants. Surveyed and monitored construction area for desert tortoise in southern Nevada. April-June 2002.

Science Student Services Contractor, U.S. Geological Survey, Fort Collins Science Center, Arid Lands Field Station. Conducted bat fauna surveys and gathered ecological and behavioral information employing mist netting, radio telemetry, and acoustic surveys; work concentrated on the big free-tailed bat in southeastern Utah. May 1999-April 2000.

Biologist, Museum of Southwestern Biology, University of New Mexico. Conducted rodent surveys in northern New Mexico to track Hanta virus. Trapped rodents, drew

blood samples, took mouth swabs, inserted PIT tags; PAPR and half face respirator certified.

Research Assistant, Department of Zoology, Brigham Young University. Created web pages and reviewed current literature for the Tree of Life project; created web pages for the Monte L. Bean Life Science Museum. September 1997-August 1998.

Biological Contractor, Environmental Science and Research Foundation and Department of Energy Idaho National Engineering and Environmental Laboratory. Investigated habitat use by summer populations of bats in sage-brush steppe; designed study; collected and analyzed field data; prepared biological reports; gave recommendations on habitat issues; assessed human impacts before, during, and after study; coordinated efforts with state and Federal agencies; supervised field technicians; used radio telemetry and acoustic surveys; presented on results to scientific community. June 1996-October 1998.

Teaching Assistant, Department of Zoology, Brigham Young University. Lab instructor and lecture assistant for Ecology (Zool. 350, 351), vertebrate/invertebrate zoology (Zool. 204), Evolution (Zool. 475). September 1995-April 1996.

Biological Consultant, Sunrise Engineering, Inc. Conducted Biological Evaluation and Biological Assessment of the Snake Creek Hydroelectric plant re-licensure project; collected field data, reviewed environmental documents, literature reviews, evaluated impact of project on vegetation and streams, corresponded with U.S. Fish and Wildlife Service for compliance, prepared Biological Evaluation and Biological Assessment. February 1996-August 1996.

Research Crew Supervisor/independent contractor, Bureau of Land Management. coordinated and supervised volunteers in conducting surveys for spotted bats in southern Utah; mist netted bats, used bat detector hardware and software, technical literature reviews, collected field data, analyzed field data, aided in report preparation, conducted consultations regarding protection and mitigation. September 1995-June 1996.

Biological Technician, U.S. Forest Service, Uinta National Forest, Spanish Fork Ranger District and Pleasant Grove Ranger District. Conducted surveys for sensitive species of birds and bats. October 1993-October 1995.

Field Experience:

Utah – 46 weeks
Idaho – 18 weeks
Nevada – 10 weeks
New Mexico – 9 weeks

Mexico – 5 weeks
Costa Rica – 2 weeks
Wyoming – 2 weeks
Texas – 1 week

Publications:

W. L. Gannon, R. E. Sherwin, and **S. Haymond**. 2002. On the importance of articulating assumptions when conducting acoustic studies of habitat use by bats. *Wildlife Society Bulletin*, x:xx-xx (In Press).

Sherwin, R. E., **S. Haymond**, D. Stricklan, and R. Olson. 2002. Freeze branding for permanently marking temperate bat species. *Wildlife Society Bulletin*, 30:97-100.

Sherwin, R. E., W. L. Gannon, and **S. Haymond**. 2000. The efficacy of acoustic techniques to infer differential use of habitat by bats. *Acta Chiropterologica*, 2:145-153.

Presentations at Professional Meetings:

Evaluating bat activity using acoustic sampling along transects. American Society of Mammalogists, 79th Annual Meeting, June 1999.

Cryogenics as a permanent marking technique for temperate Chiropteran populations. Seventh International Theriological Congress, September 1997.

The gating and management of Logan Cave, Utah: a cooperative effort. Twenty-sixth Annual North American Symposium on Bat Research, October 1996.

An alternative survey method for locating urban bat roost sites while educating large numbers of people. Colorado Bat Society, January 1996.

Professional Society Affiliations:

American Society of Mammalogists
New Mexico Bat Working Group
Utah Bat Working Group
Western States Bat Working Group

Specialized Training:

Radio telemetry techniques and data analysis.
Mist netting bats and birds.
Threatened, Endangered, and Sensitive species surveys.
Bird surveying.
Mine assessment for bats.
Global Positioning Systems.
Creating and publishing web pages.

TONY R. MOLLHAGEN

A. VITAE

Academic Address: Department of Civil Engineering, Environmental Science Laboratory, Texas Tech University, Lubbock, Texas 79409-1023

Biographical Sketch: Dr. Mollhagen was originally trained as a field biologist (ecology, mammalogy, ornithology, parasitology) but has more than ten years field experience in studies of the human and environmental effects of exposure to pesticides. He is also familiar with the methods for measuring standard water and wastewater quality parameters as well as with chemical residue methods and quality assurance procedures required for testing environmental contaminants. For the past 12 years his chief research interests are surface and groundwater quality, bioassays and index species as expressions of water quality, and the fate of environmental contaminants. Dr. Mollhagen presently teaches courses in Water Chemistry, Process Chemistry, Water and Wastewater Analysis, Environmental Measurement, Environmental Risk Assessment, and Limnology.

Born: 28 April 1939, Lorraine, Ellsworth County, Kansas. Married, three children.

Foreign Languages: written and spoken Spanish (fair); written technical French, Portuguese, Russian (fair)

Education:

B.S. (1965); M.S. (1967), Biology, Fort Hays Kansas State University, Hays
Ph.D. (1976), Biology, Texas Tech University, Lubbock

Professional Experience:

1987-present. Director, Environmental Science Laboratory, and Associate Professor, Department of Civil Engineering, Texas Tech University
1982-1992. Adjunct Assistant Professor, University of Texas School of Public Health, Houston
1983-present. Adjunct Assistant Professor, Department of Agronomy, Horticulture and Entomology, Texas Tech University, Lubbock
1990-present. Research Associate, The Museum, Texas Tech University, Lubbock
1982-87. Director, Texas PHAP, and Assistant Professor, Dept. Preventive Medicine and Community Health, Texas Tech Univ. Health Sciences Center, Lubbock, Texas
1977-82. Research Associate, Texas Pesticide Hazard Assessment Project (PHAP), San Benito, Texas.

Agencies Funding Research:

Center for Energy Research, Texas Tech Univ.; 1 proj. as co-PI, \$40,000. High Plains Underwater Conservation District; 6 proj. as PI, \$154,624. City of Lubbock; 2 proj. as co-PI, \$228,504; 1 proj. as PI, \$12,061. US DOE; 4 proj. as co-PI, \$850,000. Brazos River Authority. 3 proj. as PI, \$109,000. TTU, Water Resources Center. 5 proj. as PI, 2 as co-PI, \$54,650. US EPA; 11 proj. as PI, \$1.1 million; 9 as co-PI, \$575,000. National Agricultural Chemicals Association; 1 proj. as PI, \$20,000. US EPA/USGS; 1 proj. as PI, \$135,000. US DHHS. PI, \$35,000. Texas Department of Agriculture; 1 proj. as PI, \$12,500.

B. SELECTED PUBLICATIONS (>50 total)

- Bogan, M.A.; and Mollhagen, T.R. 1969. Wind training in some prairie trees. *Southwestern Naturalist*, 14:134-136.
- Mollhagen, T.R. 1971. A gray hawk in the Davis Mountains of Texas. *Bulletin of the Texas Ornithological Society*, 4:10.
- Mollhagen, T. R., Wiley, R. W. and Packard, R. L. 1972. Prey remains in golden eagle nests in western Texas and New Mexico. *Journal of Wildlife Management*, 36:784-792.
- Mollhagen, T.R. 1973. Distributional and taxonomic notes on some west Texas bats. *Southwestern Naturalist*, 17:427-430.
- Mollhagen, T.R. 1978. Habitat influence on helminth parasitism of the cotton rat in western Texas, with remarks on some of the parasites. *Southwestern Naturalist*, 23:401-407.
- Pence, D. B., Mollhagen, T. R., and Forrester, D. J. 1975. *Tetrameres (Gynaecophila) strigiphila* sp. n. from the Florida barred owl, *Strix varia alleni*, with notes on the status of the subgenus *Gynaecophila* (Nematoda:Tetrameridae). *Journal of Parasitology*, 61:494-498.
- Mollhagen, T. R. 1979. The cysticercus of *Taenia rileyi* Loewen, 1929. *Proceedings of the Helminthological Society of Washington*, 46:98-101.
- Mollhagen, T. R.; Guillen, A., Jr.; and Cox, V. F. 1984. A preliminary survey of organochlorine pesticide residues in the soils of the lower Rio Grande Valley of Texas. [Final Technical Report to US EPA]
- Mollhagen, T. R.; and Dary, C. C. 1987. Pesticide residues in the groundwater of California, Nebraska, and Kansas. Texas Pesticide Hazard Assessment Project, Texas Tech University Health Sciences Center, 188 pp. [Final Technical Report to USEPA and USGS]
- Mollhagen, T. R. 1991. A study of the parasitic nematode genus *Tetrameres*. I. The literature, 1835-1985. *Spec. Publ. Mus., Texas Tech Univ.*, 35:1-75.
- Choate, L. L., Manning, R. W., Jones, J. K., Jr., Jones, C., and Mollhagen, T. R. 1991. Records of mammals from the Llano Estacado and adjacent areas of Texas and New Mexico. *Occ. Papers Mus., Texas Tech Univ.*, 138:1-11.
- Schramm, H. L., Jr.; Black, R. C.; Mollhagen, T. R.; Ramsey, R. H.; Smith, L. M.; and Urban, L. V. 1991. Fisheries, waterfowl, and recreation in an urban stormwater management system. Pp. 65-77 in *Proceedings of the Water for Texas Conference* [Lubbock, TX, 5-6 December], Solutions to non-point source pollution (R. Jensen, ed.). Texas Water Resources Institute, Texas A&M University, 165 pp.
- Sweeten, J. M.; Marek, T. H.; McReynolds, D.; Wyatt, A. W.; Mollhagen, T. R.; Pennington, H. D.; Urban, L. V.; and McDonald, T. 1992. An assessment of ground water quality at two Texas High Plains feedlots. *Beef Cattle Research in Texas*, Texas Agricultural Experiment Station, 10 pp.
- Mollhagen, T. R.; Urban, L. V.; Ramsey, R. H.; Wyatt, A. W.; McReynolds, C. D.; and Ray, J. T. 1993. Assessment of non-point source contamination of playa basins in the High Plains of Texas (Brazos Basin Watershed, Phase 1). *Water Resources Center, Texas Tech University*, 23 pp + app. [Final Report to Brazos River Authority and Texas Water Commission]
- Mollhagen, T. R., and Fish, E. B. 1994. Playa basin classification using geographical information systems. Pp. 137-151 in *Proceedings of the Playa Basin Symposium* (L. V. Urban and A. W. Wyatt, eds.). *Water Resources Center, Texas Tech University, Lubbock*. 324 pp.
- Mollhagen, T. R., and Bogan, M. A. 1997. Bats in the Henry Mountains region of southeastern Utah. *Occasional Papers, Museum of Texas Tech University*, 170:1-13.
- Fish, E. B., Atkinson, E. L., Shanks, C.H., Brenton, C. M., and Mollhagen, T. R. 1998. Playa lakes digital database for the Texas portion of the Playa Lakes Joint Venture region. Technical Publ. T-9-813, College of Agricultural Sciences and Natural Resources, Texas Tech University, Lubbock. [CD ROM disk]
- Harkins, V. R., Mollhagen, T. R., Heintz, C. E., and Rainwater, K. A. 1999. Aerobic biodegradation of high explosives, phase 1-HMX. *Bioremediation Journal* 3:285-290.
- Hall, D.L.; Sites, R.W.; Fish, E.B.; Mollhagen, T.R.; Moorehead, D.L.; and Willig, M.R. 1999. Playas of the Southern High Plains: the macroinvertebrate fauna. Pp. 635-665 in *Invertebrates in freshwater wetlands of North America: ecology and management* (D.P. Batzer, R.B. Rader, and S.A. Wissinger, eds.). John Wiley & Sons, Inc., 1100 p.
- Mollhagen, T. R. 2000. Type localities of mammals in the Henry Mountains, Utah, with comments on the 1908 itinerary of W. H. Osgood. Pp 7-22 in *Reflections of a Naturalists* (J.R. Choate, ed.), Fort Hays Studies, Special Issue 1, 1-241pp.

CYNTHIA A. RAMOTNIK
BIOGRAPHICAL SKETCH

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Professional Preparation:

State University of New York, Oneonta, Biology, B.S., 1977
Colorado State University, Zoology, M.S., 1988

Appointments:

Museum Specialist, U.S. Geological Survey, Museum of Southwestern Biology, Albuquerque, NM,
1993-present
Museum Specialist, USFWS, Biological Surveys Collection, Fort Collins, CO, 1988-1993
Museum Technician, USFWS, Biological Surveys Collection, Fort Collins, CO, 1984-1988
Museum Technician, USFWS, Division of Herpetology, National Museum of Natural History,
Washington, DC, 1983-1984
Museum Technician, USFWS, Division of Mammals, National Museum of Natural History,
Washington, DC, 1979-1983

Publications:

Bogan, M.A., and C.A. **Ramotnik**. 1999. Mammalian species diversity of the Grand Staircase-Escalante National Monument. Pp. 153-159 in Learning from the land. Grand Staircase-Escalante National Monument Science Symposium Proceedings, November 4-5, 1997. U.S. Department of Interior, Bureau of Land Management.

Bogan, M.A. and C.A. **Ramotnik**. 1995. The Mammals. Pp. 179-246 in A biological survey of Fort Niobrara and Valentine National Wildlife Refuges. Final report to Region 6, United States Fish and Wildlife Service.

Bogan, M. A., C. Jones, R. M. Manning, and C. A. **Ramotnik**. 1992. New records of bats from Utah (Abstract). Journal of the Colorado-Wyoming Academy of Science, 24:20.

Ramotnik, Cynthia A. 1998. First record of the round-tailed horned lizard, *Phrynosoma modestum*, in Colorado. The Southwestern Naturalist, 43(4):498-499.

Ramotnik, C.A. 1997. Conservation assessment of the Sacramento Mountain salamander. United States Department of Agriculture, Forest Service, General Technical Report, RM-293. 19 pp.

Ramotnik, C.A. 1997. The cloud-climbing salamanders of New Mexico. Bajada 5(3):14

Scott, N.J., Jr. and C. A. **Ramotnik**. 1992. Does the Sacramento Mountain salamander require old-growth forests? Pp. 170-178 in Old-growth forests in the Southwest and Rocky Mountain Regions: Proceedings of a workshop (M.R. Kaufman, W.H. Moir, and R.L. Bassett, tech. coords.). United States Department of Agriculture, Forest Service, General Technical Report, RM-213.

Synergistic Activities:

Member-at-Large, Society for the Preservation of Natural History Collections, 1999-2002; 2002-2005

Chair, Resources Subcommittee (Conservation Committee), Society for the Preservation of Natural History Collections, 1992-present

Membership Committee, Society for the Preservation of Natural History Collections, 1997-present

Associate Editor, Collection Forum, 1998-present

U.S. Geological Survey MESC Museum Property Committee, liason

Collaborators and Other Affiliations: Dean Biggins (U.S. Geological Survey); James F. Findley (retired-University of New Mexico); Debra Jones (New Mexico State University); Mike Lannoo (Ball State University); Michael Wunder (Colorado State University).

CURRICULUM VITAE

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FAX: (505) 277-0304

Education

2000-present PhD candidate at University of New Mexico (Advisor: Dr. J. Scott Altenbach)

1997 MS in Biology, Fort Hays State University (Advisor: Dr. Jerry Choate)

1993 BS in Biology (with minor in Anatomy), Colorado State University

Research Interests

Mammalogy (with emphasis on chiropteran species) and entomology:

- Taxonomy
- Systematics
- Ecology
- Diet of bats
- Genetics
- Museum curation

Current Projects

- Bat and terrestrial mammal inventory of the Colorado Plateau
- Diet and ectoparasite analysis of southwestern bat species
- Resource partitioning between *Myotis californicus* and *M. ciliolabrum*
- Taxonomy and distribution of *Myotis occultus*, *M. velifer*, and *M. volans*
- Diet differences between the common nighthawk and bats in New Mexico
- Distribution and ecology of *Lasiurus blossevillei* and *L. borealis* in New Mexico

Publications

- Sparks, D. W., and **E. W. Valdez**. In press. Food habits of *Nyctinomops macrotis* at a maternity roost in New Mexico, as indicated by analysis of guano. *The Southwestern Naturalist*.
- Ritzi, C. M., **E. W. Valdez**, and D. W. Sparks. 2002. New host and locality records of ectoparasites from Arizona and New Mexico. *The Southwestern Naturalist*, 453-456.
- Piaggio, A. J., **E. W. Valdez**, M. A. Bogan, and G. S. Spicer. 2002. Systematics of *Myotis occultus* (Chiroptera: Vespertilionidae) inferred from sequences of two mitochondrial genes. *Journal of Mammalogy*, 83:386-395.
- Valdez, E. W.**, J. R. Choate, M. A. Bogan, and T. L. Yates. 1999. Taxonomic status of *Myotis occultus*. *Journal of Mammalogy*, 80:545-552.
- Valdez, E. W.**, J. N. Stuart, and M. A. Bogan. 1999. Additional records of bats from the middle Rio Grande Valley, New Mexico. *The Southwestern Naturalist*, 44:398-400.
- Valdez, E. W.** 1998. Noteworthy records of bats from southern Colorado. *The Prairie Naturalist*, 181-182.
- Bogan, M. A., T. J. O'Shea, P. M. Cryan, A. M. Ditto, W. H. Shaedla, **E. W. Valdez**, K. T. Castle, and L. Ellison. 1998. A study of bat populations at Los Alamos National Laboratory and Bandelier National Monument, Jemez Mountains, New Mexico. FY95-97 report to Los Alamos National Laboratory and Bandelier National Monument. Los Alamos National Laboratory LA-UR-98-2418.

Other Selected Products

Valdez, E. W., S. Haymond, M. A. Bogan, and L. Ellison. 2001. Bat population study and monitoring program at Chaco Culture National Historic Park, New Mexico, 1999 and 2000. Final report prepared for Chaco Culture National Historic Park, NM.

Valdez, E. W., M. A. Bogan, L. Ellison, S. Haymond. 2001. Bat survey of El Malpais National Monument and adjacent areas, New Mexico, 1999 and 2000. Final report prepared for El Malpais National Monument, NM.

Valdez, E. W., S. Haymond, M. A. Bogan, P. Campbell, and T. Koontz. 2000. Bat population study and monitoring program at Chaco Culture National Historic Park, New Mexico, 1999. Annual report prepared for Chaco Culture National Historic Park, NM.

Valdez, E. W., M. A. Bogan, S. Haymond, P. Campbell, and T. Koontz. 2000. Bat survey of El Malpais National Monument and adjacent areas, New Mexico, 1999. Annual report prepared for El Malpais National Monument, NM.

Bogan, M. A., T. J. O'Shea, **E. W. Valdez**, A. M. Ditto, and K. T. Castle. 1998. Continued studies of bat species of concern in the Jemez Mountains, New Mexico. Annual report prepared for Los Alamos National Laboratory and Bandelier National Monument. 22 pp.

Valdez, E.W. 1997. Taxonomic status of *Myotis occultus* (Hollister). MS thesis, Fort Hays State University, Hays, KS, 24 pp.

Work Experience

- United States Geological Survey, Albuquerque, New Mexico, Wildlife Biologist 1997-present
- Kansas Wildlife & Parks; Biotechnician 1995
- National Biological Survey, Albuquerque, New Mexico; Biotechnician 1994
- Texas Tech University, Lubbock, Texas; Biotechnician 1993
- U. S. Fish & Wildlife, Fort Collins, Colorado; Biotechnician 1991-1993
- U. S. National Museum, Washington D.C.; Biotechnician 1992

Internships

- Denver Museum of Natural History, Colorado 1990

Teaching Experience

Graduate Courses In Biology

Human Anatomy Lab
Introduction to Biology Lab

Undergraduate Courses In Biology

Gross Anatomy Lab
Zoology Lab

Professional Affiliations

- American Society of Mammalogists 1994-Life
- Southwestern Association of Naturalists 1995-2002
- The North Dakota Natural Science Society 1998-2000
- Sigmi Xi 1995-1998
- Bat Conservation International 1995-1996

Professional presentations

Valdez, E. W. 2002. Taxonomy of *Myotis occultus*. Guest lecturer at Indiana State University.

Sparks, D. W., and **E. W. Valdez**. 2001. Food habits of *Nyctinomops macrotis* as indicated by analysis of guano. Poster presented to: Southwestern Association of Naturalists.

Valdez, E. W. and D. W. Sparks. 2001. Food habits of the western small-footed myotis (*Myotis ciliolabrum*) in New Mexico. Poster presented to: Southwestern Association of Naturalists.

Piaggio, A. J., **E. W. Valdez**, M. A. Bogan, and G. S. Spicer. 1999. Taxonomy of *Myotis occultus* inferred from sequences of two mitochondrial genes. Paper presented to: North American Symposium On Bat Research

Valdez, E. W., and A. M. Parkinson. 1999. Confirmation of allozyme distinctness between *Myotis lucifugus* and *Myotis yumanensis* in the Pacific Northwest. Paper presented to: American Society of Mammalogists.

Valdez, E. W., M. A., Bogan, T. J. O'Shea, A. M. Ditto, and K. T. Castle. 1998. Continued studies of bat species of concern in the Jemez Mountains, New Mexico. Paper presented to Los Alamos National Laboratories.

Valdez, E. W., J. R. Choate, T. L. Yates, and M. A. Bogan. 1997. Taxonomic status of *Myotis occultus* Hollister. Paper presented to American Society of Mammalogists.

Valdez, E. W., and J. R. Choate, T. L. Yates, and M. A. Bogan. 1997. Taxonomic status of *Myotis occultus* Hollister. Paper presented: Southwestern Association of Naturalists

Valdez, E. W., J. R. Choate, T. L. Yates, and M. A. Bogan. 1996. Taxonomic status of *Myotis occultus* Hollister. Poster presented to: American Society of Mammalogists.

Valdez, E. W., J. R. Choate, T. L. Yates, and M. A. Bogan. 1996. Taxonomic status of *Myotis occultus* Hollister. Poster presented to: Southwestern Association of Naturalists.

Workshops, Public Service, and Consultations

Workshop on monitoring trends in U.S. bat populations: Problems and Prospects 1999

Natural Bridges National Monument; (Bat species of the area) 1994

Consultation about bat colony in cathedral at Victoria, Kansas 1994

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Education

- 2001 Pursuing doctoral work in French Literature at University of New Mexico, Albuquerque, NM.
- 2000 Master of Arts degree in French Studies, Brigham Young University (BYU), Provo, UT.
- 1997 Bachelor of Arts degree in French Studies and Music (BYU).
- 1994 Two-year professional diploma in Business Administration (*BTS* degree) from the *Association de Formation Professionnelle pour Adultes* (AFPA) in Vincennes.
- 1987 Two-year academic diploma (DEUG degree) in Humanities and Social Sciences with an emphasis in Psychology and Linguistics at the University of Paris X, Nanterre.

Pertinent Work Experience

- ▶ **Volunteer on Black Bear Research Crew (5/99-8/99)**
Experience with ATV operation and four-wheel drive; seasonal experience with live trapping, sedation, and handling of black bears, and data collection; handling of large and small mammals. Winter work hiking and working in snow and rugged conditions.
- ▶ **Insect Bio-diversity Survey, Grand Staircase-Escalante National Monument, UT (7/00).**
Work on crew collecting insects on the Monument. Camping and hiking in extreme environments and desert habitats. Experience with four-wheel drive and taking GPS coordinates.
- ▶ **Outdoor experience**
Extensive rock climbing and ice climbing experience; camping, backpacking, hiking, working and living in wilderness conditions.

References

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